THE DOCK & HARBOUR AUTHORITY

No. 85. Vol. VIII. NOVEMBER, 1927.

PLEASE NOTE.
Editorial Office:
18, Harcourt Street,
London, W.1.

Editorial Comments.

PLEASE NOTE.
Publishing Office:
19, Harcourt Street,
London, W.1.

THE PORT OF DIEPPE.

The Port of Dieppe is one of five notable ports on the north-west coast of France, comprising from East to West: Calais, Boulogne, Dieppe, Havre and Cherbourg. A considerable passenger traffic plays its part in the economy of each of them. In the case of Calais, Boulogne and Dieppe it is partly domestic as between France and England, and partly exchange traffic of passengers proceeding overland to the Mediterranean countries and Eastern Europe. Havre and Cherbourg to the west are distinguished by the transatlantic character of their passenger traffic.

Although sound use has been made of those geographical advantages possessed by the port site of Dieppe, there is a complexity about the topography of its basins and docks and the cargo and berthing accommodation which has arisen from successive schemes of construction which contains the latent elements of the problem of avoiding congestion in dealing with shipping. The approach to the coast from the English Channel is sheltered by an artificial haven enclosed by two breakwaters. These constitute, as it were, the jaws of the port, the larger being situate on the north-east and embracing by its sweeping curve a larger sector of water area than its complement on the south-west.

A channel, 75 metres, or approximately 245½ ft. wide, leads into what is known as the outer port, which runs inland in a south-westerly direction, being bounded on one side by the coastal fringe and on the other by the eastern port area. It links up with the Fish Basin, which has a dual function as a vestibule to the Duquesne Basin, still further inland to the south-east. Away due east of the Duquesne Basin is the extensive Inner Port, which connects on the north with the main outer waters of the harbour by way of the Pollet Channel.

To the south-east of the Inner Port is the Canada Basin, a rectangular dock which links up with the longest of all the basins, the Paris Basin, which is bounded by the Morocco Quay to the north-east, and the Norway Quay, on the south-west side. Away to the north-east is the Arques River, whose waters are diverted artificially below the North Quay of the Canada Basin into the expanse of the inner port.

The Pollet area forms a land core, around which are grouped respectively the Outer Port to the north-west, the Inner Port to the north-east, the Duquesne Basin to the south-east and the Fish Dock to the south.

The Bérigny Basin forms a western pendant to the Duquesne Basin, the two being south of the Pollet area, whilst the Dry Dock forms a niche on the east of this island hub.

The distance between the entrance channel and the beginning of the inner channel is 420 metres. The inner channel, slightly curved, is 400 metres long and 75 metres broad, with a depth of 4 metres below the level of the zero of the charts, giving about 36 ft. at high water ordinary neap tides and about 42 ft. ordinary springs.

The outer harbour has an area of 14 acres for accommodating vessels, quayage of 870 metres and landing and storage space of 10,000 square metres. The harbour is deepened to 4 metres below the zero of the marine charts. The inner harbour has a surface area of 4 hectares, quayage of 150 metres and quay space of 3,500 square metres. The Pollet Channel has been dredged 1½ metres lower than the zero of the marine charts. The Fish Dock has an area of 9,400 square yards and is deepened to zero of the marine charts. Dieppe has four graving docks, the Retenue, the Bérigny and the North and South Canada Docks.

The Retenue Dock is 54 ft. wide, the Bérigny 45 ft. 11 in., and the North and South Canada Docks each 59 ft. 6 in. The heights of the lock sills above zero of the charts are: Retenue 5 ft. 3 in., Bérigny 6 ft. 6 in., Canada Dock North 39¼ in., and Canada Dock South zero. Heights of water on lock sills at ordinary neap tides, ordinary spring tides and extraordinary spring tides are respectively: Retenue 17 ft. 5 in., 24 ft. 5 in., 25 ft. 4 in.; Bérigny, 16 ft. 4 in., 23 ft. 2½ in., 28 ft. 8 in.; Canada Dock North, 26 ft. 2 in., 34 ft. 4 in., 35 ft. 6 in.; Canada Dock South, 22 ft. 1¾ in., 32 ft. 11 in., 32 ft. 2½ in.

There is also a floating dock having a length of almost 194 ft. on the stocks, 34 ft. 6½ in. wide between plates and a lifting capacity of 700 metric tons of 1,000 kilos. The careening gridiron situated alongside the Guynemer Quay is 200 ft. long and 42 ft. wide.

The total length of the dock quays is 3,000 metres and their total area for goods is approximately 140,000 square metres. Accommodation for goods in the harbour and warehouses of the port amounts to 250,000 tons, of which 130,000 tons is public and 120,000 tons private.

PROBLEMS OF RAILWAY OWNED DOCKS.

Some very vital considerations are raised in the initiation and conduct of railway owned docks. As a dock authority the railway company finds that its predominant duty is the public one of ensuring adequate facilities for shipping using its ports and to see that its docks are properly staffed and maintained in a state of efficiency. As with any other organisation on a business footing the lubrication of the machinery, both actual and administrative, is the universal and preoccupying one of finance.

Here the railway is in a decidedly more difficult position than most other businesses. There is for all the common necessity of finding the capital required to transform plans into working realities, but in the special case under review there is the added burden of heavy initial expenditure equated to a possibly remote revenue, when a railway builds docks in far-sighted anticipation of trade. The commerce has frequently to be fostered by preferential rates and heavy running expenditure, whilst many years may elapse before even interest charges on capital can be met from the actual dock revenue produced.

Computation and adjustment of dues also involves peculiar difficulties owing to a railway's special status in the public mind as an institution more at liberty to fetch and carry than to make its services pay.

An outstanding example in Britain of the courage and patience required in the launching and maintenance of a dock system in anticipation of the growth of a new trade centre, is that of the Immingham Docks of the London and North Eastern Railway. On the other hand, railway orientation into dockland may be a very valuable contributory to the public welfare, in the transport of food supply, particularly for an island nation dependent on overseas shipments, in addition to the railway's services as a common carrier.

Railway enterprise in this direction may be attended with very great benefit in the carriage of passengers. Conspicuous instances of this are to hand in such Southern Railway ports as Dover, Folkestone, Newhaven and Southampton. The latter, indeed, has a special record of past achievement and an immediate promise of still greater service having regard to the gratifying expansion of traffic in shipping passengers. Some interesting facts as to the number and size of the liners now using the port are given on another page by our Southampton correspondent.

Underlying all railway dock enterprises are the twin problems of finding outward freight for the lines converging on the port, and an inland freight either of passengers or goods for the

distributing centres along the railway system. Where the railway company owns passenger ships on favoured sea routes it can assure itself of valuable traffic. Here, again, an analogy is at hand in the Channel ports of the Southern Railway Company.

In the problem of finding sufficient quantities of merchandise to make it profitable to cater for it, the railway, given favourable support from importers and merchants, can very materially aid itself where it can afford to take the long view. In certain cases the Company may be in a favourable enough position to initiate a shipping service which will feed its port with passenger traffic. A recent example is the new Tilbury—Dunkirk service of the London, Midland and Scottish Railway with the older established one of the Irish Channel traffic of the same Company. Unfortunately, the problem of providing an inflow of goods traffic from vessels entering with merchandise is a more difficult one to be dealt with only by providing the best possible equipment, the quickest possible turn-round, and, in short, by the maintenance of the railway's reputation for expeditious handling of traffic using its docks and routes. The character of the equipment in turn will depend on the principal cargoes of the port and the ability to finance adequately the mechanics of handling.

The technical details of that last wide province is a matter for the railway docks engineer. How intricate are his problems are illustrated in the matter of coal shipment which is detailed in the light of railway practice by Mr. Harold Bird in his article overleaf.

OIL CARGOES IN PORT.

Dock authorities regard with an especially vigilant eye the handling of inflammable materials on their premises and in their new docks. At many ports it is expressly stipulated that such commodities may be handled in limited quantities and then in receptacles. Petroleum undoubtedly is one of the most familiar as well as dangerous of these materials, and in respect of which most elaborate precautions are taken, more especially at ports dealing with it as a principal article of commerce, as at Constantza, Roumania, the oil storage installations of which will be dealt with in an early issue. The terrible fires of Baku, the Black Sea oil port, provide an historic example of the ravages wrought when this combustible is involved in an outbreak.

It is, therefore, somewhat startling that a port of the pre-eminent status of London should take such risks as those implied in Sir Joseph Broodbank's letter to the "Times" on October 31st, in which he points to the significance of the revised petrol laws promulgated by the Port of London Authority and now awaiting the sanction of the Ministry of Transport.

"Briefly," says Sir Joseph, "the effect of the new by-laws is that whereas to-day no tank vessel laden with petrol may discharge her cargo higher up the river than Thames Haven, such vessels of unlimited capacity would in future be allowed to discharge at Purfleet—a point 15 miles nearer London and only eight miles below Woolwich. It is also proposed to allow vessels carrying less than 1,250 tons of petrol to proceed to any berth below Bow Creek, while the already too liberal licences for barges containing petrol are to be extended.

The present limit of Thames Haven was fixed by the Port Authority in 1912 after an exhaustive inquiry. In reporting their decision to Parliament, the Authority expressed the opinion

that the risk inseparable from the presence of vessels laden with petroleum spirit in the narrower and more crowded parts of the river is such a serious one that the Authority could not incur it consistently with a regard for the interests of shipping generally and of the many industries situated on the river banks.

The Authority added that they had satisfied themselves that the possible reduction in charges if the limit was extended to Purfleet could not be more than 1/16d. per gallon. Why have the Authority changed their mind?

Since 1912, the shipping both navigating and anchoring in the Thames has increased. Gas works, electric light works, and factories have extended down the river so that almost to Purfleet the whole of the northern bank and much of the southern bank are now occupied by or dedicated to industrial enterprises. Is all this valuable property with thousands of human lives to be placed in jeopardy of destruction by fire simply that the cost of petrol to the seller may be reduced by 1/16d. per gallon?

Sir Joseph goes on to refer to the other objections to the proposed by-laws, which will also be placed before the Minister of Transport in due course.

"Meanwhile," he says, "Londoners can picture for themselves the appalling possibilities of an accident in which a column of 20,000 tons of flaming petrol might be freed to come up to the metropolis with the flowing tide.

It is further pointed out that the London County Council and many Borough Councils are opposing the Port Authority's proposals, and that the Fire Office's Committee and other bodies are joining in the protests.

FLEETWOOD DOCK DEVELOPMENTS.

The 50th anniversary of the opening of the Wyre Dock, Fleetwood, which was observed on October 7th, was a most appropriate occasion for the announcement of further developments made by Sir Josiah Stamp, President of the London, Midland and Scottish Railway. The scheme under active consideration would enlarge the existing accommodation by widening from the water edge to the rear through the whole length of the port accommodation, with appropriate sidings alterations, and would lead to an increase of 50 per cent. in the berthing accommodation and the means of marketing, iceing and transit of fish.

It was estimated that the expenditure would run into six figures, but the Company could not enter on this joint undertaking with the town of Fleetwood without first knowing that what they were doing was the kind of thing Fleetwood really required. The proposal is, therefore, to put the details of the scheme before the people interested in order to get their views at the outset.

The aim is to improve the berthing and re-arrange the steamer services for general cargo coming in suitable vessels. It is hoped that this development would stimulate the various industries connected with fishing, and would be of greater benefit to Fleetwood than the through traffic of the Fleetwood and Belfast steamers, which is to cease.

At the same time it may be noted that the Town Council of Fleetwood is planning to spend £55,000 on a sea-wall to break the action of the sea in times of storm and high tides. Fishing is the main industry of the town and 165 Fleetwood-owned up-to-date steam trawlers are engaged therein. The railway carries the catches and 25 per cent. goes to London.

The Jubilee was marked by an Exhibition illustrative of the steam trawling industry and allied trades.

KIEL CANAL TRAFFIC.

A report received by the Department of Overseas Trade from His Majesty's Consul-General at Hamburg, states that, while the Kiel Canal traffic returns for July showed record figures, there was a decline in August of 801 vessels, aggregating 178,311 tons. Compared, however, with August, 1926, the figures show an increase of 491 vessels and 176,404 tons. The actual traffic returns were as follows:—

	No. of vessels.	Net reg. tons.
August, 1927	5,307	2,194,293
July, 1927	6,108	2,372,604
August, 1926	4,816	2,017,889

Of the 5,307 vessels in August, 2,652 were registered as sea-going steamers and aggregated 1,993,496 net reg. tons, while 36 aggregating 30,955 n.r.t. were sea-going motor vessels. These included 2,494 freight and passenger steamers of 1,984,875 n.r.t. and 109 steam tugs of 9,065 n.r.t.

In addition there were:—

2,356 sailing vessels of 101,581 tons and
261 lighters and barges of 68,249 tons.

The German proportion of the number of vessels was 70.60 per cent. and of the tonnage 42.06 per cent.

The vessels were loaded as follows:—

110 with passengers.
234 with coal.
151 with stone.
51 with iron.
736 with timber.
649 with grain.
20 with cattle.
748 with ore and other bulk goods.
889 with piece goods.
59 with general cargoes.
1,660 empty or in ballast.

Personal enquiries regarding shipping and transport matters should be made at the City Office of the Department (Shipping and Transport Section), 73, Basinghall Street, London, E.C.2.

NAIRN HARBOUR INQUIRY.

In the report of the Nairn Harbour Scheme Inquiry which appeared in the August issue, Mr. Eustace W. Porter, M.Inst.C.E., M.I.Mech.E., engineer and manager in charge of the Caledonian Canal, Inverness, was erroneously reported to have said "that fresh water was not good for vessels to be in." The fact was that Mr. Porter naturally stated that it was *an advantage* for vessels that had been long enough at sea to get fouled with marine encrustation to lie up for a period in fresh water, as such then fell off.

SUNDERLAND OIL PLANT.

An Ocean Installation for petrol has recently been completed at South Docks, Sunderland, by the Newcastle Benzol Co., Ltd. The Company's storage tanks have a total capacity of 9,000 tons or approximately 3,000,000 gallons of spirit. Cargoes of petrol, etc., have been for some time shipped to Sunderland for the ocean installations of other companies, and it is anticipated that the extra trade the storage will bring to the river will prove a benefit generally to the Port of Sunderland.

The Shipment of Coal with Reference to the Lay-out of Approach Roads and Sidings.

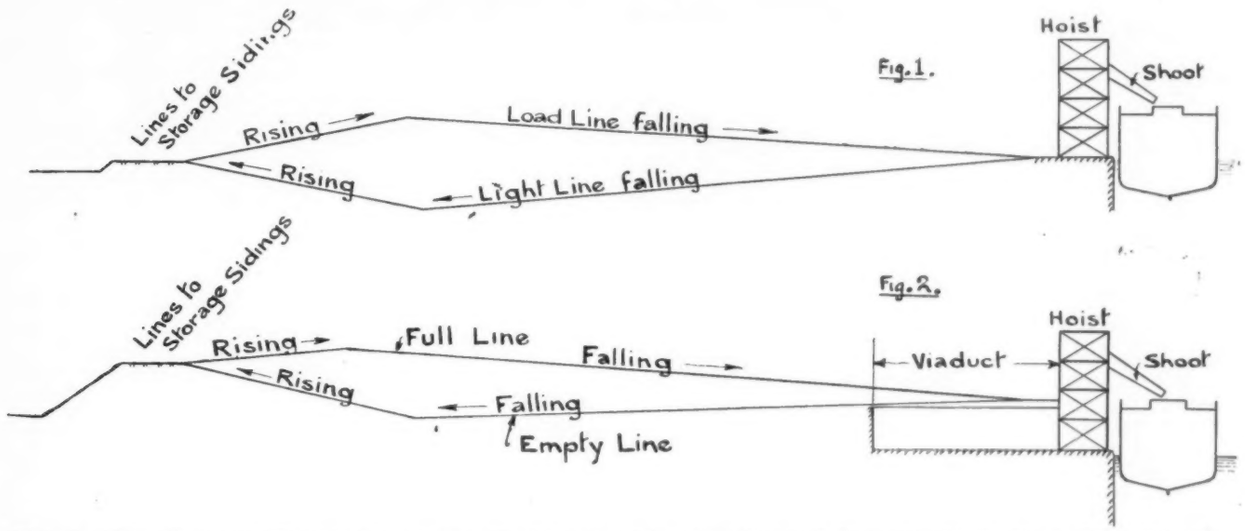
By HAROLD H. BIRD, Assoc.M.Inst.C.E., A.M.I.Mech.E.

THE principal trade of many large ports in Great Britain is the loading of coal into ships, either as cargo for export, or as bunkers for use on the voyage.

Coal constitutes one of our most important exports, and during the year 1923 the total quantity of coal shipped from ports in the United Kingdom amounted to about 112 million tons, including foreign and coastwise cargo and bunkers, while the total foreign cargo shipments was in the neighbourhood of 80 million tons.

II.—BELT CONVEYORS.

The adoption of this method for the shipment of coal is somewhat an innovation in this country, although it has long found favour at certain ports, and received tardy or no recognition at others. The coal is tipped from the wagons into hoppers or shutes, feeding inclined continuous belts, which raise the coal to the required height for delivery into ship.



Figs. 1 and 2. Diagrams illustrate two ways of approach to hoists in shipment of coal from wagons. In Fig. 1, full and empty wagons enter and leave the hoist at quay level; and in Fig. 2, at some distance above quay level.

The cheap and expeditious handling and shipment of such enormous quantities of coal is a question which must always interest Dock authorities and engineers concerned, and is one which they must carefully study, as it follows, and it cannot be repeated too often, that the shorter the time occupied in loading each ship, the greater will be the number of ships per annum using a port and the bigger will be its revenue, while the quicker turn-round of the ship will give its owner more voyages per year.

In this article, the writer does not intend to deal with the merits or demerits of the various mechanical appliances for the actual shipment of coal, which are frequently described in technical papers, but to confine his remarks to the many methods of dealing with the full and empty wagons at the shipping point, or in other words, to consider the lay-out of the lines and sidings attendant to coaling appliances.

With the modern type of boat, the chief factor which influences the rate of shipment is the facility with which the full and empty wagons are dealt with at the shipping point, as ships of the self-trimming type can be loaded as fast as the coal can be delivered into their holds.

At most ports coal is loaded into ships within closed docks, where the water level is more or less constant, the exceptions being at several Tyne and Tees ports, where the comparatively small tidal range admits of vessels lying alongside the river quays or jetties, waterborne at all states of the tide.

The actual operation of shipping coal, i.e., its delivery into ship, must obviously take place some distance above quay level, so that in most cases it is necessary to elevate the coal to the required height for shipment. Three principal methods are adopted for this operation, viz:—

I.—ELEVATORS OR HOISTS.

Elevators or hoists, commonly known as tips, operated by hydraulic or electric power, and either fixed to or movable along the quay. This is the method generally adopted, but it is only suitable for wagons having end doors, the case with the majority of wagons used in this trade. The full wagon is raised by direct lift to the required height for tipping, and after being tipped is then lowered as necessary, these operations being usually simply and rapidly performed, and modern hoists are capable of dealing with 60 wagons per hour and elevating to 70 feet above quay level.

Conveyors are fixed appliances, although a certain lateral movement can be given to the discharge spout. Both end door and bottom discharging wagons are used with this method.

III.—STAITHES OR JETTIES.

This method is confined to several East Coast ports, where the high ground in the rear enables staithes or jetties to be built on the margins of rivers high enough to deliver the coal from bottom discharge wagons directly into ships hatches by means of inclined shoots or spouts.

As no hoisting machinery is required, this is the simplest, quickest, and most economical method of shipping coal, and the staithes can be made self-acting.

With the first method I., and it matters not whether the hoist is fixed or movable, there are three systems of dealing with the wagons at the coaling wharf, viz.:—

(a) The full and empty wagons enter and leave the hoist at quay level, Fig. I.

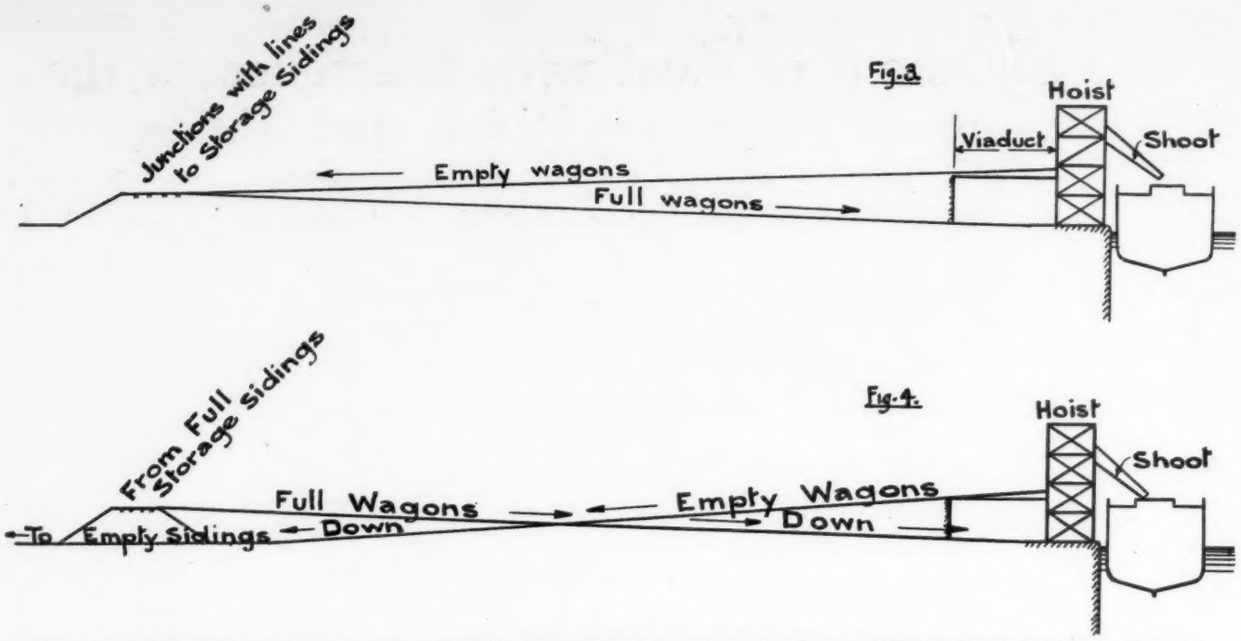
(b) The full and empty wagons enter and leave the hoist at some distance above quay level, Fig. 2.

(c) The full wagons enter the hoist at quay level and the empty wagons leave at some distance above quay level, or vice versa, Figs. 3 and 4.

In the case of the second method, II., it is obvious that both the full and empty wagons must be dealt with at the same level, which may be either above or at coping level, while in the third method, III., which is a high level system pure and simple, all wagons are dealt with at the same level at a much greater distance above quay level than in the case of either I. or II.

Whichever method is adopted, sidings must be provided at each appliance for receiving the full and empty wagons, and the wagons must run to and from the coaling quay at certain definite points, so it follows, that if the appliance is fixed, vessels loading must be moved from time to time, so as to bring each hatch in turn under the shute, or on the other hand, if the appliance is movable, as in the case of many hoists, there is no necessity to move the vessel, but the full and empty wagons must be conveyed in a lateral direction to and from the appliance and the fixed feeding point on the quay.

The adoption of any one of the above methods, I., II., or III., depends principally upon the general level and the width of the land available to the rear of the coaling wharf, but the



Figs. 3 and 4 show the arrangement when the full wagons enter the hoist at quay level and the empty wagons leave at some distance above quay level, or vice versa.

general principles governing the lay-out of the approach roads or sidings follow somewhat similar lines in each case.

Broadly speaking, the delivery of coal from the colliery to the ship, and the return of the empty wagons, involves railway services and dock or quayside services. The operations of the former include the delivery of the full wagons to and the clearing of the empty wagons from the coaling roads, involving the use of locomotive power, while the quay-side operations comprise the working of the wagons to and from the coaling appliance and the coaling roads, including the actual shipment of the coal, and involving the use of power other than locomotive power.

In designing the approach roads to coaling appliances, it is essential that the lay-out should be planned so that the full or in-going wagons are delivered to, and the empty or out-going wagons cleared from the appliance in the quickest possible time with a minimum of handling, and with the least expenditure of mechanical power, locomotive or otherwise. All wagons should move in a forward direction, reverse movements being avoided, so that the passage of wagons over the same ground twice is reduced to a minimum.

The following requirements should be aimed for in planning the lay-out of approach or coaling roads, requirements which are essential for economical and expeditious working, whichever method of shipment is adopted.

LENGTH AND CAPACITY OF SIDINGS COMPRISING APPROACH ROADS.

Each individual siding, whether for full or empty wagons, should be of sufficient length to accommodate a train load of wagons, which can be taken at forty 12 or 10-ton wagons. In an ideal lay-out the aggregate storage capacity of each group of full sidings to each appliance should be sufficient to enable the appliance to work one shift of eight hours without further supplies. This would mean the provision at each appliance of eight sidings each holding forty 12-ton wagons, or say 3,840 tons of coal, equal to a shipment of 480 tons or forty wagons per hour for an eight hour shift, a performance by no means difficult to attain with a modern appliance and efficient lay-out. When roads of such length and capacity can be provided, the aggregate capacity of the empty wagon group should be about 60 per cent. of the full wagon group, but if the lengths and capacity of the full roads are on the small side, which is usually the case, the empty roads should be of the same capacity as the full roads.

If the length of the sidings is shorter than a train load of wagons, or on the other hand, if the accommodation of the

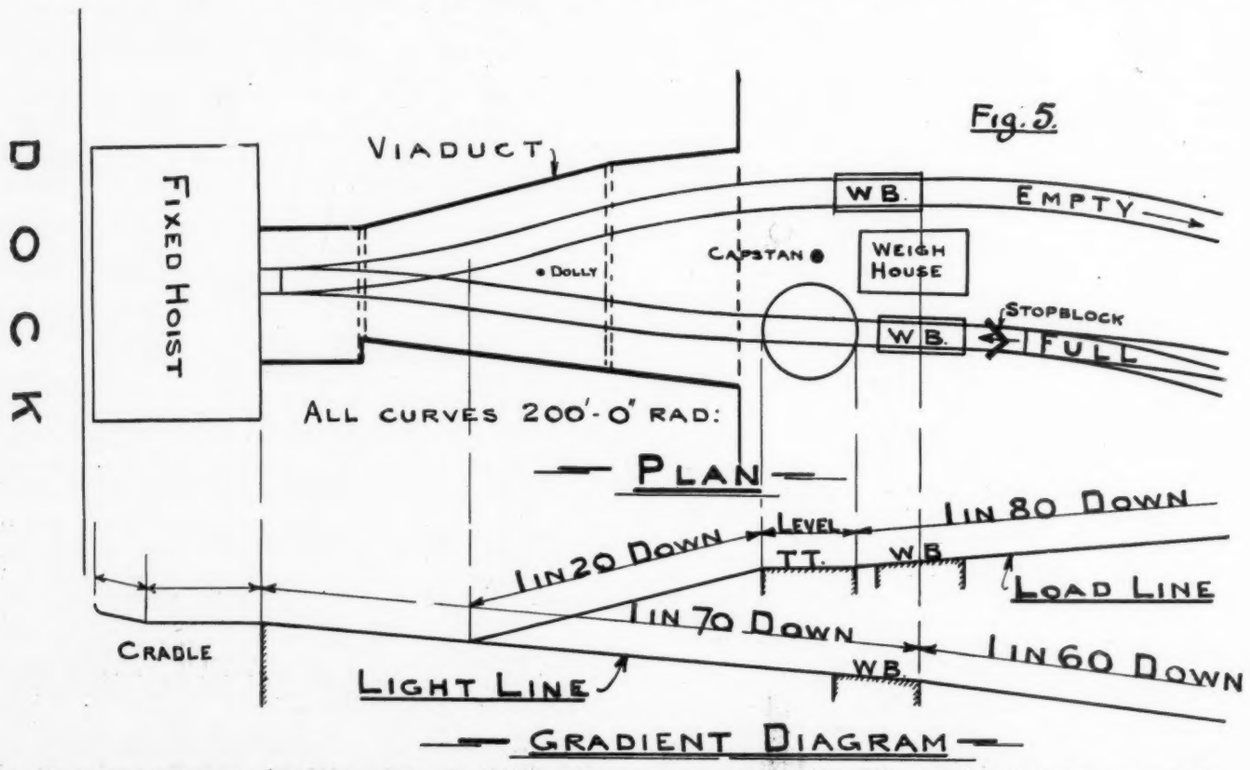


Fig. 5. The lay-out of a feed head, suitable for adoption with fixed hoists, where the wagons are dealt with either at quay level or some distance above quay level.

group of sidings is limited, it follows that increased shunting will be required in order to keep the appliance supplied with coal, and in clearing away the empty wagons. For instance, if an appliance capable of shipping forty wagons per hour is provided with say, three full and three empty sidings, the accommodation of each group being only twenty wagons, it is obvious that supplies of full and clearance of empty wagons would be needed every half-hour to keep the appliance working. In such a case the filling and clearing of the short roads involves excessive shunting operations, and if the storage sidings were some distance away, it is easy to understand that it would

With curves of small radius, there is a danger of the wagon buffers becoming interlocked, and in addition, there is a tightening up of the wagon couplings, which may result in making it very difficult, if not impossible, to uncouple the wagons. This should be guarded against, particularly with the curves at the wharf end of the approach roads where uncoupling of the wagons takes place.

The curves at the running line end of the approach roads, over which engines will have to work, should not be less than 330 feet or 5 chains radius, and it is desirable, if possible, to provide easier curves than these.

Fig. 6.

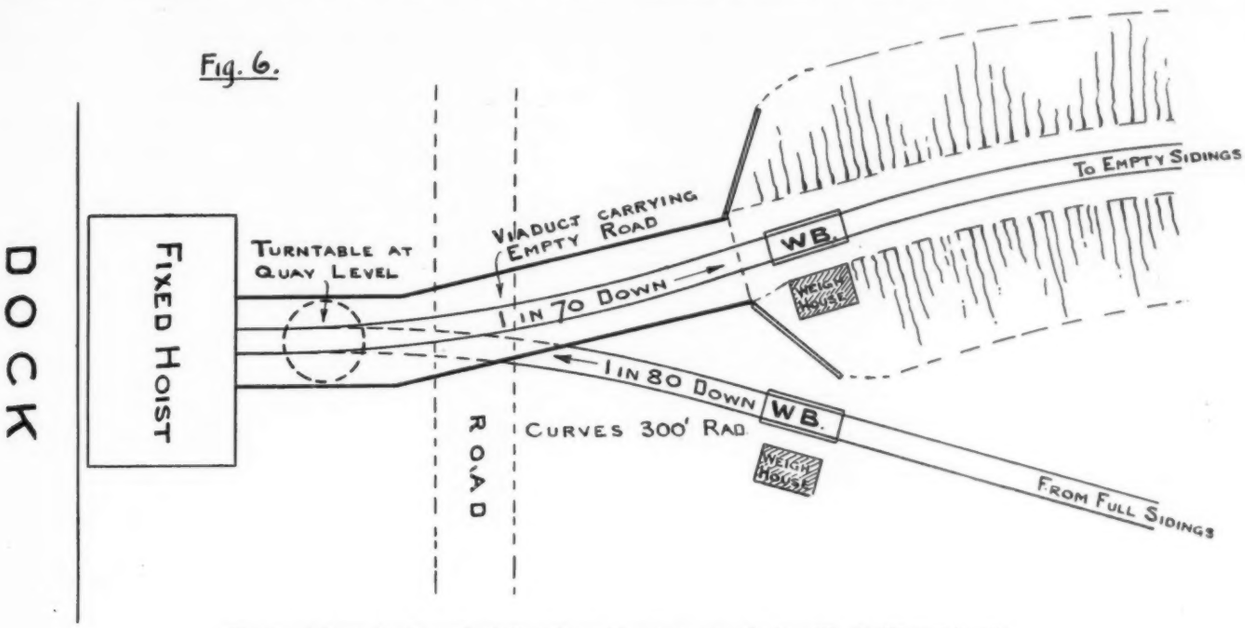


Fig. 6. A lay-out where the full and empty wagons are dealt with at different levels.

be necessary to have a locomotive in constant attendance on the appliance in order to keep it at work, and furthermore, the small train loads, would result in a loss of engine power, as the available power could not be used to its full advantage. The example mentioned above is not an hypothetical one, as the writer is aware of instances where modern appliances have been built, capable of dealing with 500 tons per hour, and where the accommodation of the approach roads is much less than that quoted.

GRADIENTS OF SIDINGS COMPRISING APPROACH ROADS.

The full or in-going, and empty or out-going roads, should be so constructed that the whole of the wagons will gravitate to and from the shipping point without the use of mechanical power, the operations being as far as practicable, automatic. The proper gradients to provide is a question upon which one cannot dogmatise, as the free running of wagons under gravity depends upon the type of the wagon, whether it is fitted with oil or grease boxes, the condition of the weather, dry or wet, hot or cold, curvature of the track, the weight of the wagon, and upon the length of the roads. The most suitable gradients for the free running of wagons under gravity will be somewhere in the neighbourhood of one in eighty for full wagons and one in seventy for empty wagons, but, as previously stated, hard and fast rules cannot be laid down, and each case must be considered on its merits. The question of gradients is also affected by the level of the land at the rear of the coaling wharf, as will be shown later.

CURVES OF SIDINGS COMPRISING APPROACH ROADS.

The radius of the curves is a question requiring careful consideration, as upon this depends to a large extent the free running of wagons under gravity and the effective length or capacity of the approach roads. It may be taken that engines will not be required to run over the junctions at the dock or appliance end of the approach roads, and these can be of smaller radii than the curves at the other or running line end over which engines must pass to fill and clear the coaling roads.

An ordinary 10-12 ton wagon having a wheel base of nine feet can freely be hauled or drawn round a curve of 80 feet radius, but such wagons will not run round a curve of this radius under gravity alone. For 10-12 ton wagons no plain curve should be less than 100 feet radius, and for 20-ton wagons having a wheel base of 12 feet, not less than two chains or 132 feet radius. The curves of turn-outs for either type of wagon, should not be less than 250 feet radius, especially if wagons are required to gravitate freely over them. Although the wagons will pass round curves of smaller radius than those mentioned, it is very undesirable that they should do so, as the wagons are liable to be strained and develop defects.

The approach roads should be schemed so that the largest siding accommodation possible is obtained in the space available. Single turn-outs should preferably be adopted, but in order to increase the capacity of the sidings it may be found advantageous to utilise three-way junctions.

GENERAL CONDITIONS GOVERNING THE DESIGN OF APPROACH ROADS.

As previously stated, the method of shipping coal is determined by the general level and the width of the land available at the rear of the coaling wharf, and although the following remarks apply principally to approach roads adopted with hoists, they also apply to a large extent to those adopted with conveyors and staithes.

The full and empty running lines, i.e., the lines connecting the tip roads to the storage sidings or main lines are invariably at the same level, at varying heights above quay level depending upon the general level of the land at the rear, and when this level cannot be raised much higher than quay level, the two running lines must be at the same level and the wagons enter and leave the hoist at quay level, see Fig. 1. Under such conditions it is a difficult matter to provide suitable gradients to the approach roads to ensure gravity working.

Fig 7.

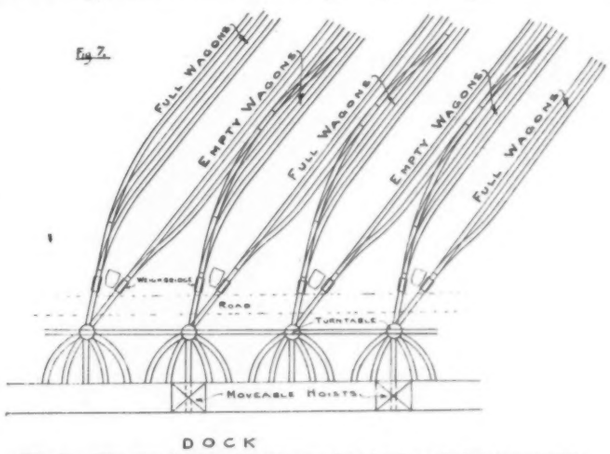


Fig. 7. Wagons dealt with at quay level where hoist is movable. Five radiating or ring-tailed roads are provided between the hoist and the feed roads, a turntable forming the common centre of all the lines.

To some extent this can be arranged by constructing the full sidings with a short steep grade from the running lines, forming a hump of sufficient height to give the necessary falling

gradient to cradle level, the gradients to the empty roads being similarly arranged, except, of course, reversed. With such an arrangement, the construction of the roads, apart from the excavation and filling required for cutting and embankment, usually involves the building of long and heavy retaining walls, rendering the cost of construction very high, and although gravity working may be thereby obtained, it is at the expense of additional locomotive power, and a loss in the effective storage capacity of the sidings. The drainage of the empty roads sometimes presents difficulty, especially if near to and

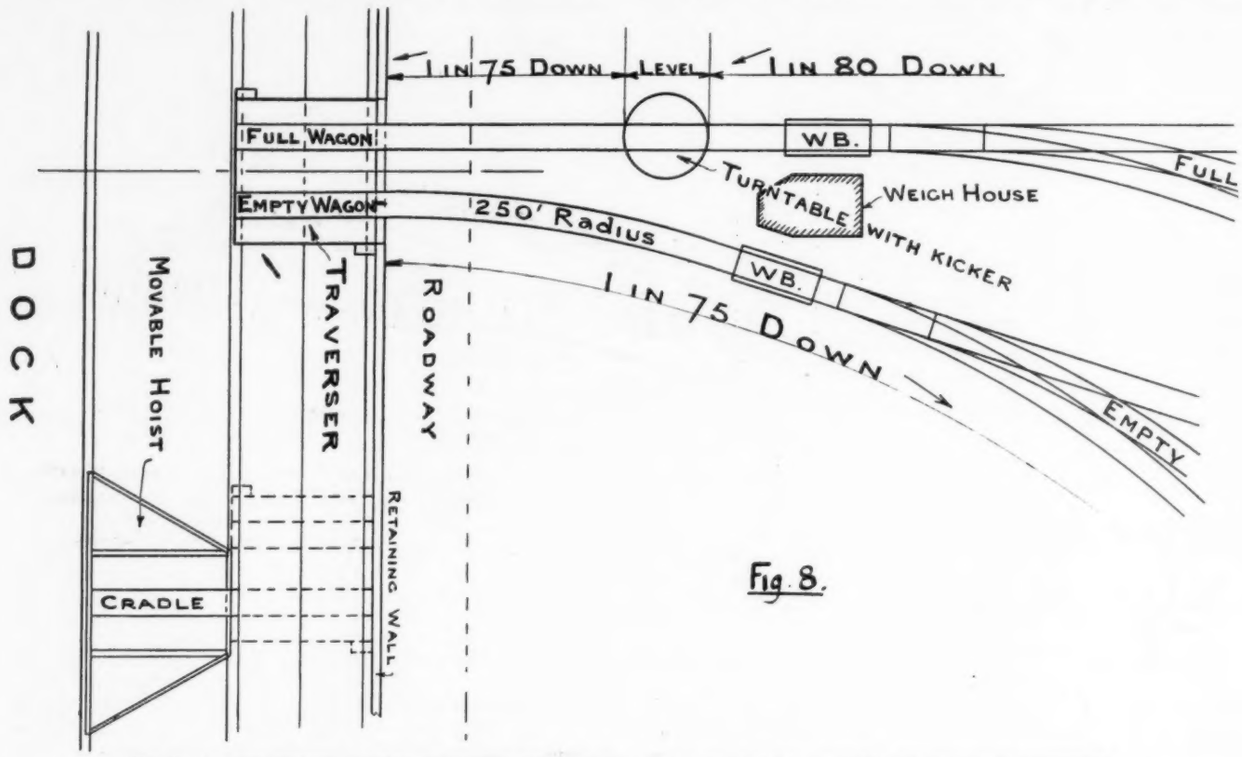


Fig. 8.

Fig. 8. A more modern method of dealing with wagons, when the hoist is movable, by means of traversers.

below the water level of the dock or tide. The writer is aware of cases where such roads are often flooded to an extent that work is held up or delayed, causing considerable inconvenience and loss.

When the level of the ground at the rear of the wharf is, or can be raised a sufficient height above quay level, the arrangement shown in Fig. 2 is generally adopted, which is somewhat similar to the previous arrangement, except that all wagons enter and leave the hoist at the same level, some distance above the quay. The advantages of this arrangement are, that the wagons reach the tip cradle about 18 feet above quay level, thus obviating the raising and lowering of them through this distance, and furthermore enabling the work to be carried on without interference with the quayside traffic below, as the lines at the feeding point can be carried across the quay on gantries or bridges. This arrangement is sometimes called the high level system, but it should not be confused with the high level staithe system previously mentioned.

With the arrangement just described, there is a certain amount of time lost at the feeding point in dealing with the wagons, as the full wagon cannot be placed on the hoist cradle, until the preceding one returning empty, has cleared the roads, but this loss of time can be reduced to a great extent by the adoption of the arrangement shown in Fig. 3, where the full

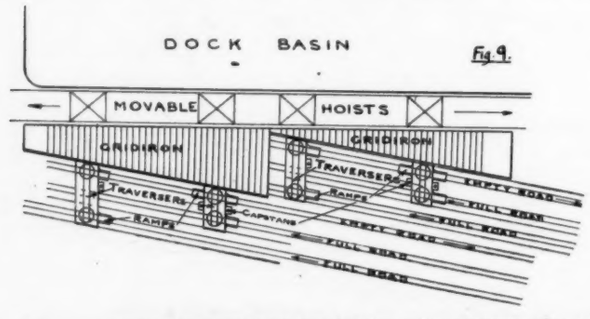


Fig. 9. Another arrangement for dealing with wagons where the hoists are movable and the ground at the rear of the coaling wharf is restricted in width.

wagons enter the hoist at quay level and the empty wagons leave it by means of a viaduct, at a higher level, thus enabling a full wagon to be brought forward in readiness to be placed on the empty cradle as soon as it reaches quay level, while the previous wagon is being raised and tipped. An improvement on this arrangement is shown in Fig. 4, the only difference being that instead of the running or serving lines being at the same level, the load line is at a higher level, apart from the light line, and is carried over the outlet from the empty sidings to the light line by means of a bridge. This is an ideal arrangement, as the full wagons can be placed on the approach roads, and the empties cleared, without the respective movements interfering with each other. When the level and lie of the ground available, enables either of these arrangements to be adopted, it will generally be found, particularly in the case of that shown in Fig. 4, that the approach roads can be graded to from the running lines, to ensure purely gravity working, without having to buy it as in the case of the arrangements shown in Figs. 1 and 2.

LAY-OUT OF FEEDING POINTS.

The lay-out of the feeding points, i.e., the arrangements for dealing with the wagons between the coaling appliance and the full and empty approach roads, is a simple matter in the case of conveyors and staithes, as will be shown later, but is often a difficult problem in the case of hoists. The expeditious handling of the wagons at the feeding point is a question of supreme importance, as it is there where time is usually lost if the operations to be performed are excessive.

As mentioned before, hoists are either fixed to, or movable along, the quay, and invariably deal with end tipping wagons, and as the 10 and 12 tons wagons used for shipment coal are provided with doors at one end only, it will readily be gathered that many wagons will approach the hoist the wrong end on, and turntables must be provided to turn them in the proper direction. Furthermore, it is the practice at most ports to weigh all full wagons before tipping, and retare the empty wagons after tipping, and it is necessary to perform these operations at the shipping point, which involves the provision of two weigh-bridges. Fig. 5 illustrates the lay-out of a feed head suitable for adoption with fixed hoists where the wagons are dealt with at the same level as in Figs. 1 and 2, while Fig. 6 shows a suitable lay-out where the full and empty wagons are dealt with at different levels, as in Fig. 3.

When the hoist is movable along the quay the full and empty wagons must be conveyed in a lateral direction to and from the coaling hoist and the fixed feed point. An old-fashioned arrangement, but a very simple and effective one for performing these operations when the wagons are dealt with at quay level is shown in Fig. 7, where five radiating or ring-tailed roads are provided between the hoist and the feed roads, a turntable forming the common centre of all the lines. With such an arrangement, except when the hoist is opposite the centre line, all wagons empty and full, even if the end door faces in the right direction for tipping, have to be part turned, and, furthermore, a full wagon cannot leave the weigh-bridge until the preceding one has been tipped and cleared from the turn-

table. It will be evident that these operations result in a considerable loss of time in dealing with the wagons at the shipping point. All wagons have to be hauled to and from the cradle by means of capstans, and the mobility of the hoist is limited.

wharf is restricted in width, is shown in Fig. 9. Raised platforms are fixed alongside the hoist track and feed roads, the platforms carrying a number of rails laid to the same gauge, comprising a series of tracks forming what is called a gridiron. Two traversers running upon the feed roads and

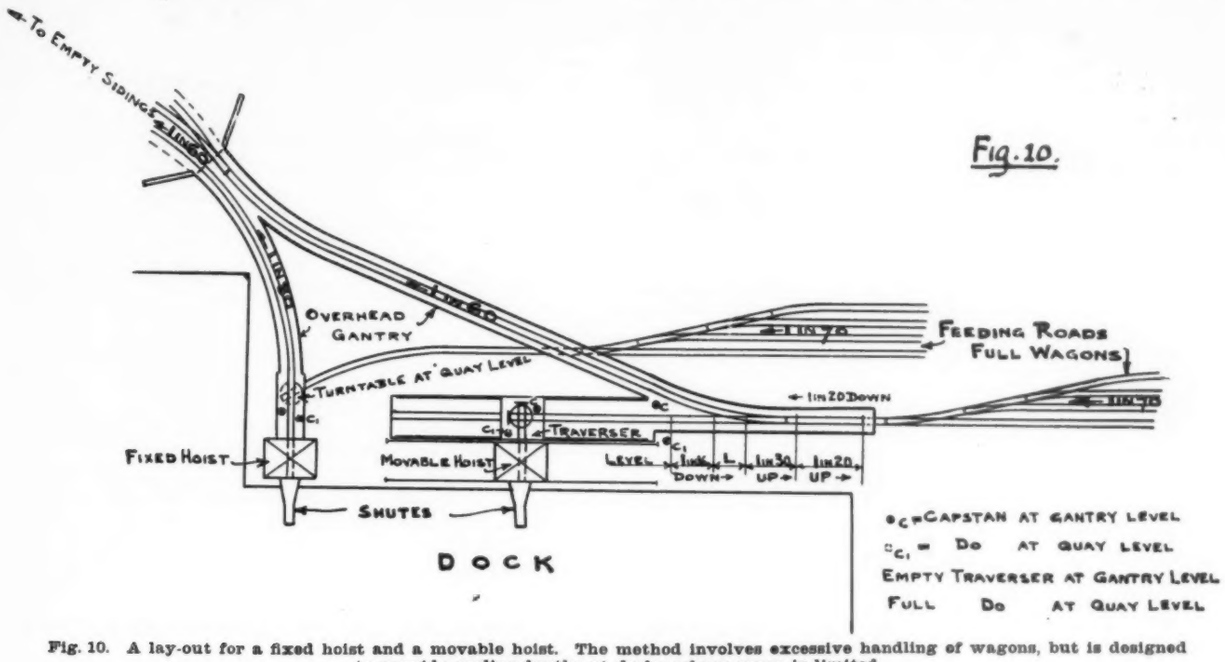


Fig. 10.

Fig. 10. A lay-out for a fixed hoist and a movable hoist. The method involves excessive handling of wagons, but is designed to provide coaling berths at docks where space is limited.

An improved, more modern method of dealing with the wagons when the hoist is movable, is by means of traversers as shown in Fig. 8. The traverser is provided with two tracks, one for full and one for empty wagons, spaced to exactly correspond with the tracks at the feed point. The cradles carrying the two tracks on the traverser are pivoted, and arranged to tip up a sufficient height in opposite directions to give the necessary impetus to carry the full wagon to the empty roads. The cycle of operations is as follows:—The full wagon is run on to the full track of the traverser and is then traversed to the hoist, stopping when the empty track of the traverser is opposite the hoist cradle, so as to receive the preceding wagon now empty, the traverser then proceeding until the full wagon is opposite the hoist cradle; this wagon is now "kicked" on to the cradle and, when clear, the traverser returns with the empty wagon to its original position at the feed point, and the empty wagon is then run off, while at the same time the next full wagon is run into position on the traverser. This system has also been adopted, with more or less success, in cases of movable hoists where all wagons are dealt with above quay level as in Fig. 2, and where the full and empty wagons are dealt with at and above quay level respectively as in Figs. 5 and 6. In both cases the traversers are carried by elevated gantries, but in the latter case two traversers are required, fitted with capstans for moving them to suit the position of the hoists, are provided for each gridiron, each traverser carrying a full and empty road with turntables. The full wagons are drawn on to the traverser by the capstans, up a ramp attached to the traverser, and are then turned and run on to the hoist cradle.

The empty wagon, after being tipped, is then drawn on to the empty road turntable, turned and run down the ramps into the empty roads. It will be seen from the diagram that this arrangement can only economically be applied to a short length of quay, and as every wagon must be turned and the empty wagons cleared from the traversers before a full one is run on to the hoist cradle, there is a considerable loss of time owing to the multiplicity of movements.

Fig. 10 illustrates a lay-out for a fixed hoist and a movable hoist, and here again the excessive handling of wagons and number of operations militates against rapid and economical loading. It will be noticed that for the movable hoist two traversers are provided, one at quay level for full wagons and one carried by an overhead gantry for the empty wagons, and that every wagon must be part turned twice, while in the case of the fixed hoist, every full wagon must be part turned, and in both cases the empty wagons are carried away from the cradle to the empty sidings by means of overhead gantries.

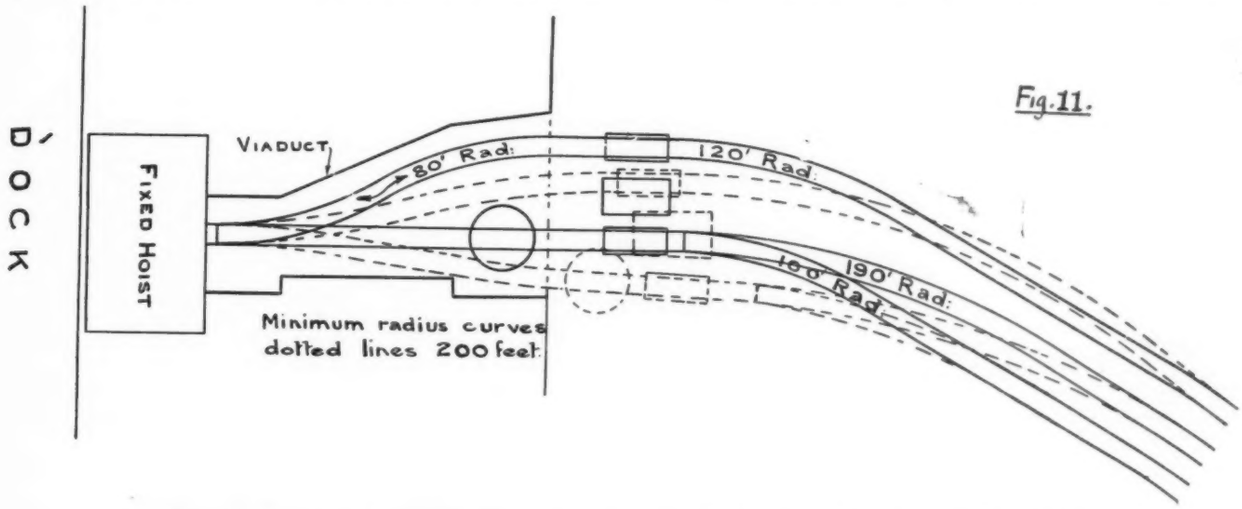


Fig. 11.

Fig. 11. A more or less straight run-in for the full road, but the sharp curves mean difficult working.

one at quay level and one at the higher level for dealing with the empty wagons.

Another arrangement, somewhat novel in conception, which has been adopted for dealing with the wagons where the hoists are movable and where the ground at the rear of the coaling

The arrangement of gradients, particularly for the empty wagons from the movable hoist, should be noted.

This last example is an elaborate arrangement, expensive in first cost and in working; but like the previous one it exemplifies, if nothing else, the dock engineers' ingenuity in over-

coming difficulties due to restricted space, in order to provide coaling berths.

The following essential requirements should be observed in laying out the feeding points:—

A toggle-jointed stop-block preferably operated by a hand-lever, should be provided on the load feed line at the back of the weigh-bridge so as to allow one wagon at a time to be run on to the weigh-bridge and to check those following on, thus avoiding the walking down of wagons and checking them by means of the brakes and sprags, which would otherwise be necessary. The efficacy of such a stop-block depends upon the gradient, as unless the wagons will gravitate down to the block, little advantage is gained by its adoption. For obvious reasons the weigh-bridges and turntable should be placed as close to each other, and as near to the hoist as possible. These positions will be governed by the clearances required to allow a wagon to be turned, when not central on the table, at the same time as an empty wagon is passing on the adjacent line, and also when a full wagon is uncentralised on the weigh-bridge. It is well to give ample clearances, more so for the safety of the tippers working the wagons.

The turntable should be fixed between the weigh-bridge and the hoist, and the weighers house should be placed between ths machines and directly opposite to them, while the gradients should be continued over the weighing machines.

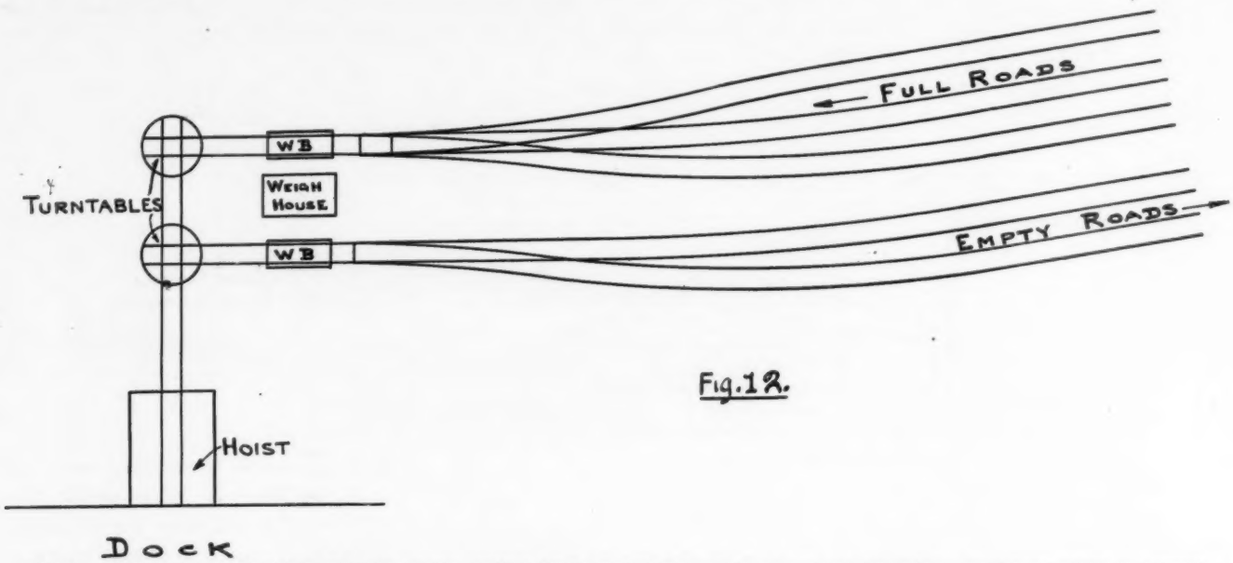


Fig. 12.

Fig. 12. With land restricted at the rear of the coaling berth, a straight run-in or run-out depends on sufficient width to connect the approach roads to the feeding point with curves of the required radii.

The turning of the turntable and the hauling of the wagons therefrom to the hoist is usually performed by means of hydraulic capstans, although in some cases, to avoid the use of capstans, the turntables are operated mechanically, and also provided with mechanical kickers to give the wagons the necessary lift or impetus to impel them on to the cradle. It is admitted that capstans are wasteful appliances in the use of pressure water, but at the same time they are simple, easily operated, cheaply maintained, and elastic in their operations.

Experience has shown that in many cases capstans are necessary to assist the wagons along, as it is difficult to arrange gradients to ensure the free running of all wagons; and if gradients cannot be provided, which is sometimes the case, the provision of capstans or jiggers is essential.

The gradients at the feeding point will be somewhat different to those of the feeding roads, more so in the case of Figs. 1 and 2, where the full and empty wagons are dealt with at the same level. The full road falls to the hoist and the empty road away from the hoist, so if a common crossing is used, it will be readily understood that both gradients cannot be continued to and from the hoist, as the rails at the crossing must be at the same level. This difficulty can be overcome by having the lines level from the crossing to the cradle, and although this is sometimes done, it should be avoided, as it means capstaning the wagons to and from the cradle, resulting in a considerable loss of time. A much better method and one which has been found perfectly satisfactory in practice, is to give the full line a short, sharp fall from the turntable to the crossing, and a short, sharp rise to the two lines from the crossing to the cradle, so that the full wagons gravitating to the crossing receive the necessary impetus to carry them up the rising gradient to the cradle, and the wagons, after tipping, leave the cradle on a falling gradient to the empty approach sidings, as shown in Fig. 5.

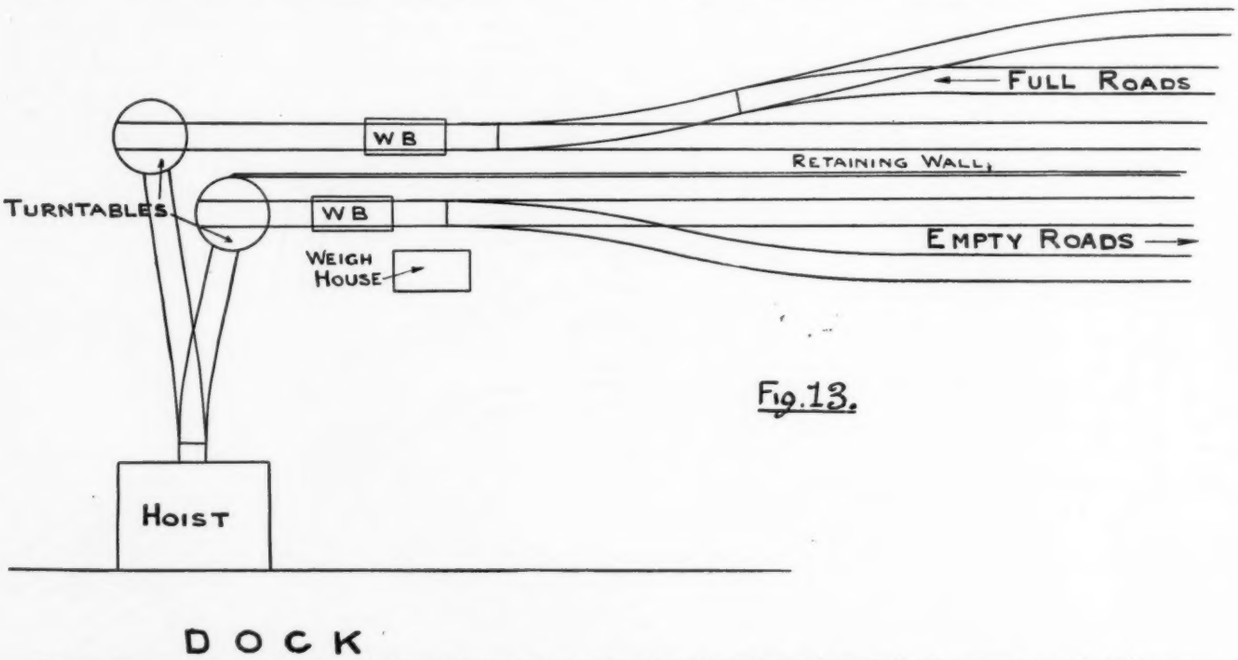


Fig. 13.

Fig. 13. The narrower the land available at the rear of the wharf, the flatter the angle made by the approach roads to the quay, and upon this depends the length of the approach roads.

An alternative arrangement, which enables a falling gradient to be given to both the full and empty lines, consists of a short length of rail hinged at one end, capable of sliding over the lower rail and normally set for the full road. It is forced open by the wheel flanges of the empty wagons and brought back to its normal position by means of a spring or counter-weight, but it is a clumsy arrangement and the more simpler common crossing is to be preferred.

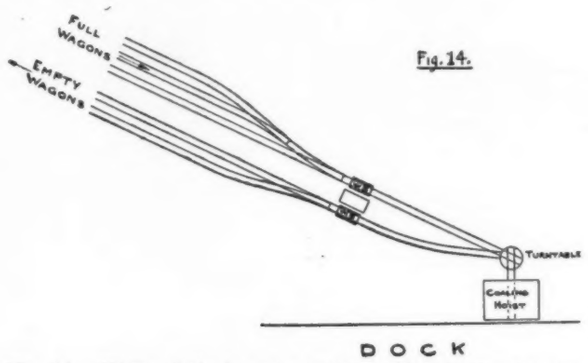


Fig. 14. Where there is not sufficient width to connect the approach roads to the feed point by means of curves, turntables must be provided, as every wagon will have to be turned irrespective of whether the end doors face the cradle or not.

It is invariably the practice of tippers to drop the leading wheels of the empty wagon from the cradle before it reaches rail level, and when it is perhaps 6-in. to 12-in. above, the object being, so they think, to give the wagon initial impetus to send it down the empty line. This practice cannot be too strongly condemned, as it has very damaging effects upon the gantry structure and rails. If the rails fixed on the cradle are given an upward inclination towards the tipping horns, this will be quite sufficient to give the empty wagons the necessary impetus to run off the cradle and gravitate down the empty road.

The arrangement of the roads at the feed point also depends upon the angle which the approach roads make with the quay. Traffic officers, quite rightly, favour what they describe as a "straight run-in," i.e., the running of the wagons to and from the hoist without curves, but, of course, this can only be arranged to a limited extent, and Fig. 11 shows a lay-out designed to meet this requirement. It will be noticed that although a somewhat straight run-in has been provided for the full road, it has resulted in very sharp curves which can only be worked with difficulty. The provision of easier curves would have meant considerable alterations to the approach roads, and the fixing of the empty weigh-bridge some distance back and away from the full weigh-bridge.

A better and more economical lay-out could have been obtained by arranging an equilateral turn-out as shown by dotted lines superimposed on Fig. 11. This is obviously the best arrangement, as easy running curves are obtained, and

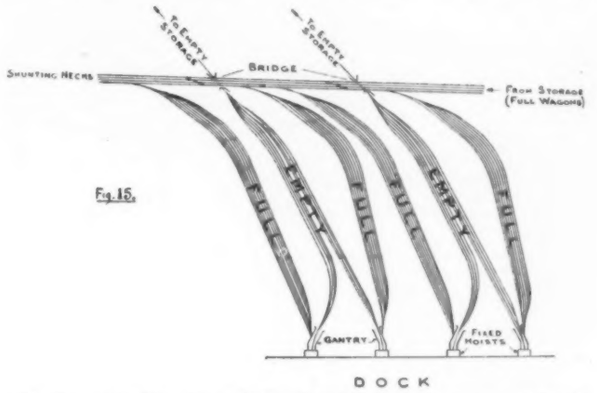


Fig. 15. A modern lay-out for shipping coal by means of fixed hoists.

where the wagons are dealt with above quay level the most economical, as the area of viaduct or gantry required is much less than required for an ordinary turn-out.

Where the full and empty wagons are dealt with at different levels, as in Fig. 6, there is usually no difficulty in arranging a straight run on to the cradle. With this arrangement the turntable should be placed as near to the hoist as clearances will admit, so that a full wagon can be run close up to the cradle, while the preceding one is being tipped, and also if necessary to clear the roadway alongside the quay. If the wagons have to be retared, two weigh-bridges must be provided, high and low level machines respectively, and this means that two weighers will be required.

When the land to the rear of the coaling wharf is restricted in width it is impossible to provide a straight run-in or run-out, unless there is sufficient width to connect the approach roads to the feeding point with curves of the required radii, as it follows that the narrower the land available at the rear of the wharf, the flatter will be the angle made by the approach roads to the quay, and upon this depends the length of the approach

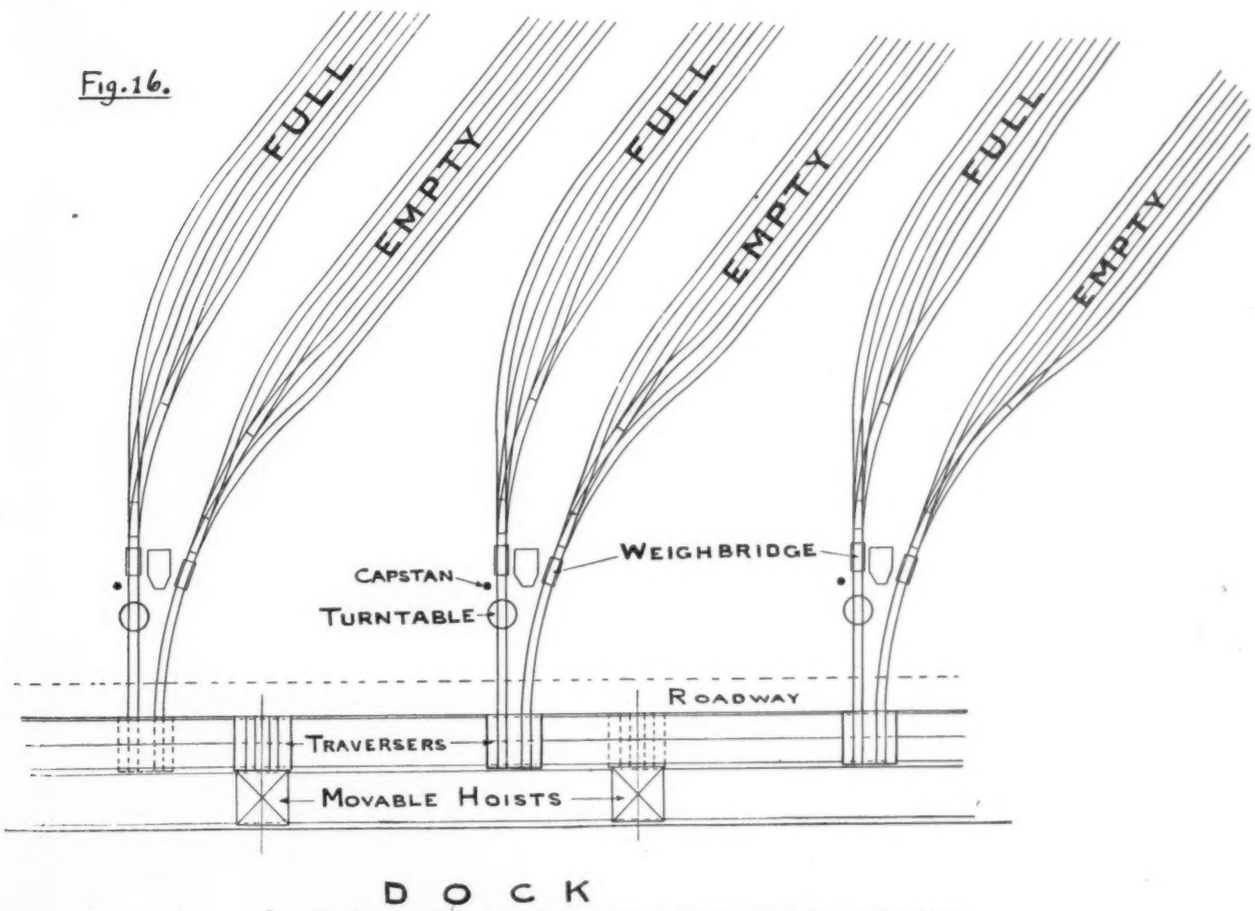


Fig. 16. A modern lay-out for shipping coal by means of movable hoists.

roads. If there is not sufficient width to connect the approach roads to the feed point by means of curves, then turntables must be provided, as every wagon will have to be turned irrespective of whether the end doors face the cradle or not.

Figs. 12, 13 and 14 show arrangements which have been adopted in cases where the condition just mentioned exists,

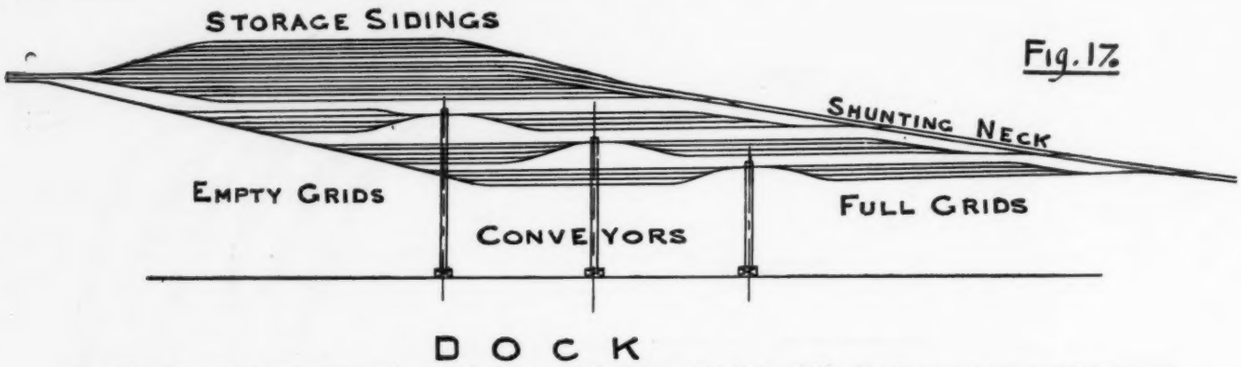


Fig. 17. A lay-out for conveyors where land at rear of wharf is restricted in width. Feeding roads run parallel to quay.

and a glance at these will suffice to indicate the extra handling required in dealing with the wagons and the disadvantages compared with the examples where a normal run-in is provided. Two modern lay-outs for shipping coal by means of fixed and movable hoists are shown in Figs. 15 and 16 respectively.

When coal is shipped by conveyors and staithes, no turntables are required for marshalling or dealing with the wagons, as in the former method the wagons can be tipped at either end of the hopper, and in the latter method bottom discharging wagons are used; and in neither case is it necessary for the wagons to run normal to the quay as they must do when hoists are used. As no turning of the wagons is necessary, it will be appreciated that the lay-out of the feed points for conveyors and staithes is a much easier matter than in the case of hoists.

Fig. 17 shows a lay-out for conveyors where the land at the rear of the wharf is restricted in width, the feeding roads running parallel to the quay. This is an ideal arrangement, as all wagons run in a forward direction, the operations consisting merely of weighing and tipping the wagons.

Fig. 18 shows a lay-out for conveyors where the feed roads approach the appliances in a more or less inclined direction, but in this case it will be seen that there is a certain loss of time at the tipping point as the empty wagon must clear the crossing before a following full one can be run forward. In this example the arrangement of gradients should be noticed, particularly the switching back of the empty wagons from the one conveyor into the small group of dead end sidings.

In the light of present day knowledge and experience, many of the older docks are badly laid for dealing with the shipment of coal, in some cases the defects being inherent to their location and beyond remedy, and in other cases to obsolete appliances and inefficient feed roads more or less possible of improvement. In many instances appliances have been improved to meet modern requirements without an improvement to the feed roads, with the result that little or no advantage has been gained, the improvements of the one being vitiated by the defects of the other.

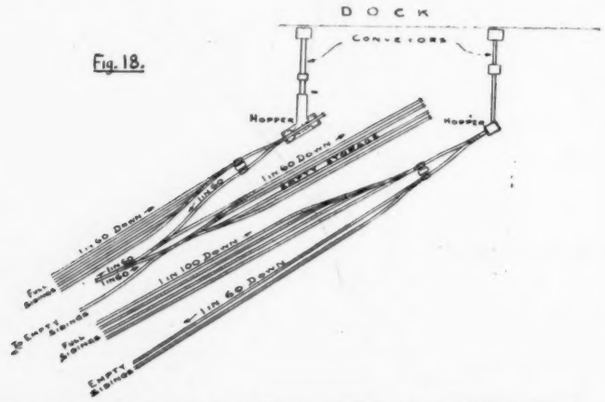


Fig. 18. A lay-out for conveyors where feed roads approach appliances in an inclined direction. Note arrangement of gradients and the switching back of empty wagons from one conveyor to the small group of dead end sidings.

It is oftentimes argued that the rate of rapid shipment depends more on the trimming required in distributing the coal in the ships' holds than on any other factor, but in the writer's opinion this is not so, and too much importance is attached to this view. In any case it should be assumed that ships can take the coal as fast as it can be delivered into the holds, which is so with modern ships, and modern coaling appliances are invariably designed with a high working speed capable of delivering practically a continuous supply to the ship, but it will be realised from the foregoing remarks that unless it is possible to deal with the wagons at the feeding points as expeditiously as they can be dealt with by the coaling appliances, no advantage will be gained by the high working speed of the latter, and the writer ventures to say that in many instances this point has been lost sight of, as high-speed appliances capable of dealing with sixty wagons per hour have been installed at berths where the lay-out of the feeding roads does not admit of more than twenty wagons per hour being dealt with, and then only at the expense of excessive shunting and locomotive power.

LARGE CAPACITY WAGONS.

For many years past the use of wagons of larger carrying capacity than 10—12 tons has been advocated for the conveyance of coal for shipment, but it is only within recent years that their adoption has increased to any extent. There can be no difference in opinion as to the advantages of even wagons of 20 tons capacity compared with the smaller types at present in use.

The carrying capacity of a 20 tons wagon is 100 per cent. more, while the siding accommodation necessary is reduced by 35 per cent., or, in other words, the capacity of existing sidings is increased by 35 per cent., and this is a material gain when sidings are restricted in length, and as the wagons are provided with tipping doors at each end the operations at the shipping point are reduced, the speed of shipment increased, and the increased rate of shipment enables a quicker turn round of vessels to be attained.

New Steam Oil Tanker.

Power Trials of the "British Endeavour."

The steel single-screw steam oil tanker *British Endeavour*, built to the order of British Tanker Company, Ltd., by Sir W. G. Armstrong, Whitworth and Co., Ltd., at their Armstrong yard, carried out, with satisfactory results, her official full power trials as set under fully loaded conditions on October 14th.

The moulded length of the vessel is 380 ft., with a moulded breadth of 50 ft., and she is designed to carry 6,400 tons dead weight at a mean speed of 11¼ knots per hour.

The machinery, which was constructed by The Wallsend Slipway and Engineering Company, Ltd., is placed at the after end of the vessel, and consists of direct acting surface condensing triple expansion engines of the most modern and improved design. Steam is supplied by two multitubular boilers at a working pressure of 200 lbs. per square inch, and the boilers are thoroughly equipped for oil burning on an improved system.

The owners' representatives at the trials—Mr. McGregor and Captain Williams—were highly satisfied with the trials, as the machinery worked smoothly and the speed obtained by the vessel was ¼ knot in excess of that guaranteed.

PORT CHARGES AT DUNKIRK.

The Department of Overseas Trade has received from His Majesty's Consul at Lille a report compiled by His Majesty's Vice-Consul at Dunkirk, giving details of dues and charges now in force at that port, including crane hire, hire of pneumatic elevators, graving dock charges, pilotage dues, hire of boatmen, watchmen and fireguards, towage charges, shipbrokers' fees, principal port dues, taxes on imports and exports, special charges for the use of pontoons and petroleum docks, charges for weighing and fresh water, stevedoring charges and warehouse charges.

Charleston's Waterfront Driveways.

By ROY S. MacELWEE, Commissioner of Port Development, City of Charleston, South Carolina.

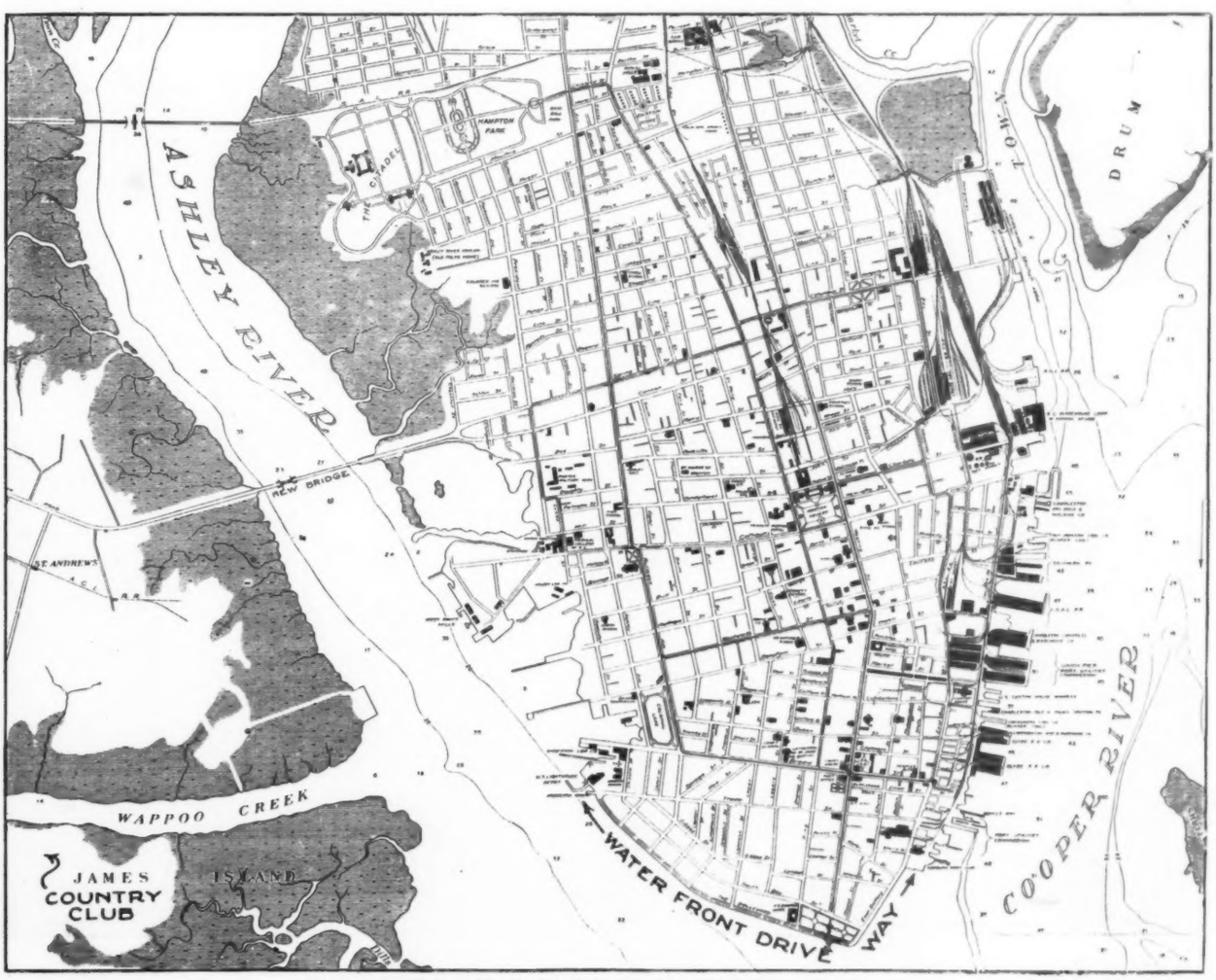
The Battery, White Point Gardens, Charleston, where the Waterfront Drive turns West and North again.

Boulevard Lots are Home Sites commanding a view across the broad Ashley River. The prevailing Winds are South-westerlies.

CHARLESTON, South Carolina, has made an effective start in the rational use of its waterfront for parkways as well as for industrial development and marine terminals.

Charleston is geographically well adapted to full utilization of its shore line; it is strikingly like New York in its contours, only on a smaller scale. It is built on a long narrow peninsular which barely escapes being an island similar to Manhattan. Its two rivers, the Cooper and the Ashley, unite at the Battery to form Charleston Bay, that is separated from the sea by a series of islands, James Island, Sullivan's Island, the Isle of Palms, corresponding to Staten Island, Graves End, Coney Island, Rockaway, etc.

The early settlers from 1680 on built their houses along the irregular contours of high land, frequently separated from the channel by wide tidal marshes, while the shipping naturally gravitated to the deeper river, the Cooper River, where various generations of wharves have been constructed. The residences sought the lower tip of the peninsula where Colonel Wm. Washington, in 1760, built the residence now standing in perfect preservation facing what was called White Point Gardens. Colonel Washington was a cousin of George Washington and



Map of Charleston, South Carolina, showing Waterfront Driveways.

High Battery, looking down East Battery, Charleston.

East Battery from the Bay.

the commanding officer in the Continental victory in the Battle of Eutaw (1781). Other points of high land (the word "high" being used to mean land permanently above the high tide level) were likewise utilized for residential sites where deep porched, high-ceiling mansions, high above basements, draped trailing honeysuckle and wisteria fanned by balmy sea breezes looked out under moss-draped oaks.

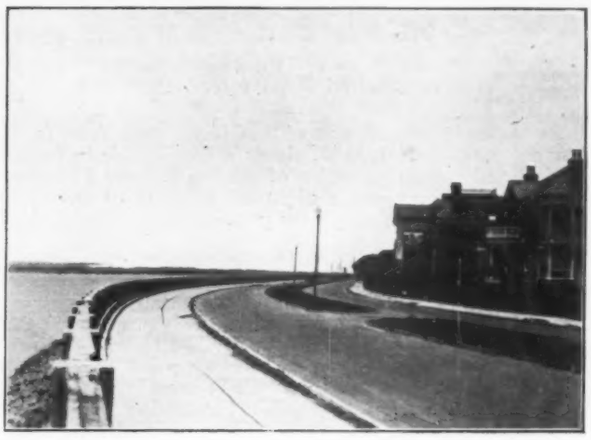
The waterfront boulevard movement started about 1830 when the present East Battery, or High Battery, with its sea wall, was constructed from Shamrock Terrace (now the Shrine Club), and the marshes behind it filled in. The stately, high and fortress-like mansions with wide columned porches and fine iron grills across doors, windows and gateways, with one exception, became fully developed by 1850 as they now stand. This was the first utilization for a driveway for residences and for a promenade of the waterfront that otherwise might have been occupied by wharves. But this would have been of value to shipping only by the great effort necessary to overcome the tendency of shoaling, due to the fact that the rivers meeting at this point slow up and drop their silt. It was along this very wall on High Battery that the excited population of Charleston gathered to watch the bombardment of Fort Sumter, on April 12th, 1861, from Fort Johnson on the tip of James Island and now occupied by the Quarantine Station. A promising young assistant bank cashier was offered a substantial promotion in rank, salary and opportunity in an enterprising new interior city, but declined because he preferred to remain in Charleston, where every Sunday "he could worship in St. Michael's Church and then walk on High Battery."

The Ashley River Marshes were gradually encroached upon and filled in here and there as opportunity afforded, but no substantial effort was made to construct a waterfront boulevard along the Ashley River until the term as Mayor of R. Goodwyn Rhett, sometime President of the Chamber of Commerce of the United States. From 1909 to 1911 a sea wall, promenade and driveway was extended from the Battery at the foot of King Street to Tradd Street, where a continuance of the shore line for civic development is blocked by the U.S. Lighthouse Headquarters for the 6th Naval District with its repair shops and the park of buoys. The area added forty-seven acres of high-class residential property to Charleston.

The boulevard has added a full mile to the old East or High Battery. Mr. A. B. Murray, a public-spirited citizen of Charleston, personally paid for the missing link in the driveway along the park, "White Point Gardens," thus making it possible for automobiles to circulate down East Bay, East

Charleston, South Carolina, the Manhattan of the South Atlantic. Cooper River Waterfront. Left foreground: High Battery and East Battery Waterfront Drive. Left distance: Marshes on the Ashley River awaiting Parking Development. Right foreground: Piers, Dry Docks and Shipping, 30-ft. deep at mean low water and 35.2-ft. deep at mean high water. Right distance: Industrial Development.

Ashley River Branch of Charleston Harbour and the Murray Boulevard past White Point Gardens.



The Boulevard, one mile of Drive and 48 acres of New Lots reclaimed from the Marshes.

Battery along the Cooper, and turn North-west on Murray Boulevard along the Ashley River to Tradd Street.

The people of Charleston feel that this is only the beginning. There are marshes and flats between natural high land and the Ashley River above the Lighthouse Station beyond the new million and a half dollar Ashley River Memorial Bridge. The titles to a large portion of these flats have already been acquired by the City, and other portions are owned by public-spirited citizens who will join with the city as soon as city finances and the demand for waterfront residence property will permit the continuation of the boulevard the full length of the frontage on the Ashley River.

Although Charleston has not yet passed a zoning ordinance and adopted a city plan, by accident or by the logic of geographic, hydrographic or meteorological situation, there has developed a rational city plan. This is not sufficient to preserve the historic and architecturally unique colonial city; yet, the city has escaped the complete blight that has fallen upon such cities as Detroit, Cleveland, Toledo, and a hundred others. It is not necessary in its future zoning to bite into the sour apple of huge expenditure as Chicago or Toronto and several other cities have done because of early mistakes that required remedial action later at appalling expense.

The south and west part of the peninsula grew as a residential section because of the prevailing sea breezes and the views across bay and ocean. The Ashley River above the City limits has long been the site for the fertiliser and chemical plants. Twenty-one feet of water at low tide and 26 feet at high tide is sufficient for schooners and small chartered vessels in this trade. The Cooper River waterfront with thirty feet of water at low tide and thirty-five at high tide has come to be the location for the private, railroad and city wharves, the great oil refineries and tank yards, the U.S. Navy Yard, the U.S. Army Supply Base, now operated under lease by the City. All such activities demand deep water frontage capable of admitting the largest commercial vessels. The territory in the neck of the upper end of the peninsula has gradually taken on the nature of an industrial terrain of the port. However, beyond the ten mile post of the concrete highway, there are several fine club developments and estates, notably Yeoman's Hall, a proprietary Club.

By the use of the waterfront for residences and recreation on the one hand, and shipping and industries on the other, the High Battery driveway overlooking the Bay where ships pass in and out, and the sun rises in tropical splendour, and the breeze swept Ashley with its distant salt marshes, low lying islands, and sunsets of unusual brilliance—due to peculiar vaporous conditions of the low country—constitutes a water-front boulevard system that fills the visitor with enthusiasm and the heart of the Charlestonian with contentment.

The Port of Gothenburg.

Larger Traffic in 1926.

According to the yearly report issued by the Board of the Gothenburg Harbour, the results for 1926 were more favourable than those for the preceding two years; the tonnage of vessels entering and leaving the harbour increased from 4,288,000 in 1925 to 4,369,000. The amount of traffic was influenced by the coal strike, but in spite of decreased coal imports there was a general increase in traffic during the year.

The quantity of foreign wares imported and exported increased from 2,400,000 tons in 1925 to 2,490,000 tons.

The total revenue of the harbour amounted to Kr.5,004,463 or Kr.191,163 more than estimated. The operation of the harbour for the year left Kr.1,256,720 to be applied to the payment of interest on capital invested in the harbour, and the report states that the undertaking resulted in a surplus of Kr.447,731.

In the fish harbour the total value of sales by auction amounted to Kr.9,869,912, of which Kr.4,490,075 was accounted for by fresh herring. Compared with the previous year the value of sales shows an increase of 1½ per cent. and the supply an increase of about 13½ per cent. The commission earned by the harbour on these sales amounted to Kr.351,666, of which Kr.342,603 was paid by Swedish sellers. The commission levied on Swedish sellers of fresh fish (other than herring) is 4 per cent. and for herrings 3 per cent.; the rates for foreign sellers are 1 per cent. higher.

In the harbour there are now the undermentioned docks:—

A/B. Lindholmen-Motala; a dry dock which can receive vessels with a draught of 5.7 metres, 122 metres long and 17 metres wide.

Eriksbergs mek. verkstads A/B.; 3 floating docks having a lifting capacity of 1,750, 7,500 and 20,000 tons.

At Gotaverken: 2 floating docks having a lifting capacity of 9,000 and 18,000 tons belonging to A/B. Goteborgs Skepps-dockor.

The traffic in the Gothenburg Free Harbour, which is mainly trans-oceanic, has continued to increase. The tonnage of vessels to and from home ports entering and leaving the Free Harbour amounted to 480,000 tons in 1925 against 474,000 tons in 1926, and that of vessels to and from foreign ports amounted to 583,000 tons in 1925 as against 620,000 tons in 1926. The total tonnage was 1,063,000 in 1925 and 1,094,000 in 1926.

Launch of the "Belmoira."

New Single-Screw Motorship for Norway.

The motor ship *Belmoira*, a steel single-screw cargo vessel built to the order of A/S Rederiet Belmoira, Oslo, by Sir W. G. Armstrong Whitworth and Co., Ltd., was successfully launched from their Armstrong yard on October 12th.

The launching ceremony was gracefully performed by Lady Chichester. The principal dimensions of the vessel are:—

Length overall	340 ft. 9 in.
Length between perpendiculars ...	325 ft. 0 in.
Breadth moulded	49 ft. 6 in.
Depth moulded to upper deck	23 ft. 6 in.

She is designed to carry about 4,325 tons on a mean draft of 19 ft. 9 in., and is of the single-deck type with poop, bridge and forecastle, built to Lloyds highest class. The vessel is fitted with two large cargo holds and specially arranged cargo hatches for the carriage of locomotives.

The captain's and owner's accommodation is arranged on the bridge and upper bridge decks; the officers and engineers in the poop alongside machinery casing; and crew are berthed in the aft end of the poop. The double bottom is arranged for oil fuel and water ballast.

Electric generating plant is installed, consisting of two dynamos, each driven by a Diesel engine, together with wireless installation. A horizontal direct acting steam windlass capable of working a bower cable and bower anchors is fitted on the forecastle head. Six winches are fitted, four on the upper deck and two on the poop for general cargo, also a warping capstan on the poop; and in addition two electric winches for heavy lifts in the fore end of the poop. The vessel is fitted with six 5-ton, one 30-ton and one 100-ton derricks.

The propelling machinery, which has been constructed at the Marine Engine Department of Sir W. G. Armstrong Whitworth and Co., consists of a single-screw Armstrong Sulzer Diesel engine of the two-cycle type, having four cylinders 600m.m. diameter with a stroke of 1,060m.m., capable of developing 1,350 b.h.p. at 110 revolutions per minute. Two donkey boilers are installed in the engine room arranged for oil burning.

Madras Port Trust.

Administration Report for 1926-27.

The Administration Report of the Madras Port Trust for the financial year ended 1926-27, shows a considerable increase in receipts and notable expansion of cargoes in several commodities, although there was a slight fall in the total tonnage of goods which passed through the port.

GENERAL.

The monsoon of 1926 promised to yield fairly satisfactory crops of cotton, grain and seeds and consequently a brisk export trade with the Continent was expected in respect of these goods. Unfortunately, this expectation did not materialise on account of insufficient rains. The abnormal and bumper American cotton crop and the resultant drop in prices of raw cotton affected the foreign demand for Indian cotton to a considerable extent. Groundnut shipments instead of advancing kept up to the level of the previous year on account of decreased production due to failure of timely rains and the difficulty in securing easier freights owing to higher prices of coal as a result of the coal strike in England. In spite of the abnormal factors that prevailed during the year affecting the trade situation, the net result of working the harbour undertaking during the past year may, however, be considered as satisfactory.

RECEIPTS.

The actual receipts, including the contribution of Rs. 30,000 made by the Madras Port Fund, amounted to Rs. 37,39,364, the largest on record. As compared with Rs. 35,12,861 in 1925-26, the previous best year, there is an increase of Rs. 2,26,503. Though there was a net fall in the total tonnage of cargo landed at and shipped from this port during the year under review as compared with the previous year, the receipts have shown an increase due to less importation of coal during the year on which the Trust's charges are exceptionally low when compared with other goods. The main items which contributed towards the increase are—Dues on imports plus 1,33,966, dues on exports plus 9,996, transit dues 12,123, harbour terminals plus 13,558, cranage plus 29,203, rent plus 14,172, overtime fees plus 14,403, sale of water to shipping plus 17,217 and profit on investments plus 10,181. Against these increases there have been the following decreases:—Quay dues—5,494, contribution from Port Fund—5,000 and interest on investments—59,212. The increase under " profits on investments " and the decrease under " interest on investments " are due to the sale of Government paper to meet capital expenditure. The increase under cranage is due to the handling of heavy packages which came in larger quantities during the year. The increases noticed under the other heads are due to normal expansion of trade.

WORKING EXPENSES.

The gross expenditure out of revenue inclusive of interest on capital, amortization of debt and contributions to capital came to Rs. 33,06,674 as compared with Rs. 30,88,982 in 1925-26, or to the equivalent of 89.2 per cent. of the gross receipts, the corresponding percentage in 1925-26 being 87.9. Excluding from the working expenses the interest on loans which in the year under review amounted to Rs. 8,69,332, contributions to capital, payment of debt and sinking funds and omitting from the receipts Rs. 30,000, contributions made by the Madras Port Fund, the actual working expenses come to 56 per cent. of the regular harbour earnings against 53.5 per cent. in the preceding year. The net result of working for the year has been a surplus of Rs. 4,32,690 as compared with Rs. 4,23,879 in the previous year.

IMPORTS AND EXPORTS.

The total tonnage of cargo that passed through the port during the year amounted to 1,133,412 tons as compared with 1,159,834 tons in the previous year or a fall of 26,422 tons. Of this total, imports contributed 843,904 tons and exports 289,508 tons.

SHIPPING.

The number of vessels that entered the harbour has increased from 717 in 1925-26 to 795 in 1926-27, and the total net registered tonnage from 2,462,297 to 2,609,935 respectively, the figure for the current year both in the number of vessels as well as their tonnage being the largest on record. The average tonnage of each vessel has increased from 3,498 net registered tons to 3,573 net registered tons. The total number of vessels that entered the harbour during the past four years was 606, 674, 717 and 795 respectively, and the number of vessels berthed at quays during the same period was 448, 457, 540 and 597, respectively. The number of " Quay Days " or the number of days vessels were occupying the quays for the past four years has been 1,350 days in 1923-24, 1,505 days in 1924-25, 1,810 days in 1925-26 and 1,729 days in 1926-27. The vessel of the greatest tonnage which entered the port was the ss. *Talma*, of 10,000 tons gross and 6,154 tons net register, and the vessel with the deepest draught was the ss. *Howrah* drawing 28-ft. 6-in. Passengers to the number of 84,592 arrived at and 140,799 left the port, making a total of 225,391 against 174,671 during last year and 149,029 in 1924-25. Full details of the shipping that used the port will be found in the Madras Port Fund Administration Report for 1926-27.

SINKING FUND.

A sum of Rs. 66,528 was contributed during the year towards the Sinking Fund for repaying the sterling loan of £330,000 raised in the London Market in 1923 and this amount, together with the interest realised during the year on the Government securities purchased from the contributions of previous years, was invested in 3½ per cent. Government securities. The total amount of Government securities that stood to the credit of the Sinking Fund at the end of the year under review was Rs. 3,58,600. The outstanding amount of loans due to the Secretary of State for India in Council was Rs. 1,38,24,021 at the close of the year under review.

TRAFFIC—IMPORTS AND EXPORTS.

The total tonnage of imports and exports during the year under review amounted to 1,133,412 tons or a fall of 2.27 per cent. over the previous year, the tonnage for the two previous years being 1,159,834 and 1,117,221, respectively. The tonnage of imports fell by 1.58 per cent., the figure for the current year being 843,904. But if coal be eliminated, the total tonnage of the year will amount to 887,173, a record figure against 869,776 tons of the previous year. The chief falling off was in cement (4,579), coal (43,819), rice (37,083), kerosene oil (15,355), tin plates (2,024) and railway plant and rolling stock (21,471); whilst increases were noticed against mineral oils other than kerosene (17,192), iron (18,638), Australian timber (16,472), food grains other than rice (9,262), sugar and jaggery (9,200), paper and stationery (5,850), glassware (4,796), chemicals (3,165), machinery (2,911), timber other than teak and jarrah (2,860), dyes (2,708), manufactures of cotton (2,453), and provisions (2,311). Exports also decreased from 302,393 tons in 1925-26 to 289,508 tons in 1926-27 due chiefly to ores (9,252 tons), raw cotton (9,341 tons), scrap iron and steel (2,341 tons) and vegetables other than onions (1,174). Increases on the other hand were noticed against vegetable oil (2,849), onions (2,718), castor seeds (2,443), provisions (1,716), manures other than bonemeal (1,651), oil cake (1,558) and tobacco manufactured (1,345). Of the total tonnage of imports and exports, 1,130,308 tons were sea-borne against 1,153,481 tons in 1925-26 and 1,112,777 tons in 1924-25. The difference between the total traffic and the quantity sea-borne consisted chiefly of rail-borne coal which amounted to 1,407 tons against 4,406 tons of the previous year, coke 1,215 tons and timber 290. The above figures do not include 1,690 tons of railway-owned coal brought in for transhipment from broad to metre gauge. Full details of the variations in some of the chief commodities dealt with in the harbour during the year are given below:—

IMPORTS—COAL.

Coal imported during the year amounted to 246,239 tons or 29 per cent. of the total import trade against 290,058 tons in 1925-26 or a decline of 15.1 per cent. As in the previous year there were no imports of foreign coal during the year and the imports of Bengal coal have fallen from 271,533 tons to 244,832 tons. Of the entire quantity imported, 1,407 tons came by rail and the rest by sea and the major portion of the coal imported was loaded into wagons at the east quay direct from the vessels, thus ensuring quick despatch and the minimum of transhipment losses. The total tonnage of coal booked from the harbour by rail amounted to 198,487 tons in 1926-27 as compared with 245,143 tons in 1925-26. Details of coal transactions in tons for the past five years are given below:—

	1926-27	1925-26	1924-25	1923-24	1922-23
Imports by rail ...	1,407	4,406	3,119	21,127	531
Imports by sea ...	244,832	285,652	284,784	267,547	253,505
The quantity put into ships' bunkers ...	27,930	25,357	24,036	28,551	29,931
Railway coal transhipped from broad to metre gauge wagons in harbour	1,690	5,833	3,127	21,205	214

OILS.

There was a further large decrease of 21.5 per cent. in the importation of kerosene oil, only 56,009 tons representing 41.3 per cent. of all mineral oils imported, being landed during 1926-27 as compared with 71,364 tons in 1925-26 and 77,051 tons in 1924-25. The imports of foreign oil from the Straits representing Dutch East Indies production and from America have fallen by 18,724 tons, or a decrease of 53.4 per cent. over the previous year. On the other hand, imports from Burma increased by 1,938 tons, the figure for the current year being 38,106 tons. Case oil imported during the year amounted to 1,677 tons against 2,203 tons in the previous year, or a fall of 24 per cent. chiefly from America and the Straits. But the imports of fuel and other mineral oils have gone up by 32.5

per cent. from 65,516 tons in 1925-26 to 79,708 tons in 1926-27. These include 50,370 tons of liquid fuel (fuel oil) and 22,857 tons of benzine or petrol against 36,030 tons and 11,102 tons of liquid fuel and 20,703 tons and 4,428 tons of benzine respectively during the two previous years. The chief sources of supply of fuel oil (liquid fuel) are Persia, Borneo and the Straits, including Labuan. The large increase in the importation of liquid fuel of 39.8 per cent. is due to heavier bunkering and also to its increasing use for industrial purposes in place of coal. The supply from Persia formed 67.5 per cent. of the total fuel oils imported and exceeded the previous year's imports by 38 per cent. The supply from Dutch East Indies via the Straits Settlements amounted to 29 per cent. and that from Dutch Borneo to 3.5 per cent. The entire quantity of petrol imported into this port came from Burma. The increase of 10.4 per cent under petrol or benzine is due to the heavy motor traffic both at Madras as well as in the interior. The imports of lubricating and other mineral oils amounted to 6,481 tons against 5,783 tons in the previous year, or an increase of 12.1 per cent. More than 75 per cent. came from the United States of America. There was also an increase in the importation of vegetable oils by 177.7 per cent., the figure for the current year being 1,861 tons.

MACHINERY.

Imports of machinery have increased by 36.125 per cent. over the previous year's figure, the tonnage for the current year being 10,969 tons, the largest on record. Europe still continued to be the chief supplier, her share being 90 per cent. of which the United Kingdom contributed 81 per cent. The corresponding percentage in the previous year was 85.3. The increase is most noticeable under electrical machinery, prime movers and sewing and knitting machines. The larger use of electricity in Southern India and the development of the Mysoe Hydro-Electric Schemes at Kolar and Sivasamudram have accounted for the larger importation of electrical machinery. The simpler construction and cheap running cost resulted in larger importation of oil engines used for cotton spinning, oil pressing, rice mills and for other agricultural purposes. Imports of sewing and knitting machines also showed large increase from the United Kingdom.

METALS.

The imports under this head have increased from 64,725 tons in 1925-26 to 82,842 tons in 1926-27, the largest on record, and an increase of 28 per cent. over the previous year's figure. The importation of iron and steel (handled by the Port Trust) amounted to 25,437 tons against 20,655 tons in 1925-26 and the importation of iron and steel (not handled by the Trust) increased from 32,710 tons in 1925-26 to 46,566 tons in 1926-27. Of 46,566 tons, 70 per cent. came from Belgium, the United Kingdom and Germany contributing each only 8 per cent. Belgium still continued to be the chief supplier of iron and steel. The importation of tin and tin plates showed a decline from 4,858 tons in 1925-26 to 2,834 tons in 1926-27. The following tabular statement will show the imports of iron and steel and tin plates during the past five years:—

	1926-27	1925-26	1924-25	1923-24	1922-23
Iron and steel handled by the Port Trust	25,437	20,655	20,819	15,878	15,828
Iron and steel not handled by the Port Trust ...	46,566	32,710	37,675	34,883	45,833
Tin plates	2,834	4,858	4,934	4,694	6,448

RAILWAY PLANT AND ROLLING STOCK.

The imports under this head showed a fall of 44.3 per cent., the figure for the current year being 27,026 tons against 48,497 tons in 1925-26. As stated in the previous report, the materials imported for the new railway projects, the Golden Rock Scheme and for additional rolling stock and locomotives have accounted for the large importation of this commodity in the previous year.

TIMBER.

Imports of teak from Burma showed a slight increase as compared with the previous year, the figure for the current year being 26,534 tons against 25,088 tons of the previous year, or an increase of 5.76 per cent. 22,355 tons of Australian timber (jarrah sleepers for railways) were imported during the year as compared with 5,883 tons landed in the previous year. The large increase is due to the construction of new lines and heavy sleeper renewals. Imports of other timber, including firewood and shooks, have increased by 186 per cent., the figure for the current year being 4,397 tons against 1,537 tons in 1925-26. A noticeable feature of the year's imports of timber is the landing within the harbour of 2,174 tons of firewood by country craft against a nil quantity in the previous year. The tonnage of tea shooks imported in 1926-27 amounted to 1,445 tons mostly from the United Kingdom against 1,142 tons in 1925-26.

TEXTILES.

The imports of raw cotton have advanced by 116.5 per cent., the figure for the current year being 1,608 tons. Imports of twist and yarn fell by 13.4 per cent., the figure for the current year being 5,653 tons. Imports from Europe amounted to 3,554 tons, from Japan, 1,633 tons, and from Bombay, 353 tons, the corresponding figures in the previous year being 2,930, 2,563 and 678 tons respectively. Imports of piece goods rose from 5,041 tons to 7,494 tons or an increase of 48.66 per cent. due to low stocks in the market, easier money conditions and steady exchange. Imports of gunnies showed no variation, the figure for the current year being 4,938 tons. The imports under other textiles increased from 2,067 tons to 2,465 tons in 1926-27.

SUGAR AND JAGGERY.

Though the total tonnage imported during the year under this head, including molasses, amounted to 33,281 tons against 24,081 tons in the previous year, or an increase of 38.2 per cent. it is still below the record imports of 1918-19, viz., 40,624 tons. Refined and granulated beet sugar imported during the year from Europe amounted to 3,659 tons against 3,000 tons in the previous year. The high prices of Indian jaggery had created a demand for molasses from Java for the Nellikuppam and Samalkot factories managed by Messrs. Parry and Company, and during the year 4,353 tons were imported against 2,219 tons in the previous year.

CEMENT.

Imports of cement, mostly Portland cement, from the United Kingdom showed a fall of 20.3 per cent. over the previous year, the tonnage during the year being 18,002 against 22,581 tons during the previous year. The fall is due to increased production of good quality at cheaper rates of the Indian manufacture.

CHEMICALS.

Imports of chemicals showed an advance of 32.4 per cent., the figure for the current year, a record one, being 12,925 tons against 9,760 tons of the previous year.

MOTOR CARS, MOTOR CYCLES AND CYCLES ORDINARY.

The number of motor cars and 'buses imported during the year constitutes a record for the port and exceeds the previous best year by 206 cars, or an increase of 9 per cent., the figure for the current year being 2,593 against 2,387 in 1925-26. The cars and 'buses imported from Europe amounted to 687 against 497 in 1925-26 and those from America amounted to 1,865 against 1,363 in 1925-26. The imports of 'buses representing 42.4 per cent. of the total number of cars imported showed an increase of 29 per cent. The increase is due to price reduction and their greater use for commercial services. There was also a slight increase in the importation of motor cycles during the year under review, the figure for the current year being 314 against 292 in the previous year. 269 motor cycles from Europe and 17 from America were imported during the year against 217 and 13, respectively, in 1925-26. The importation of ordinary cycles also increased by 37 per cent., the figure for the current year being 2,608 tons (measurement) against 1,904 tons in 1925-26. 1,666 tons came from Europe and 691 tons from America in 1926-27 against 807 tons and 286 tons respectively in 1925-26.

RICE AND FOOD GRAINS.

There was a further fall in the imports of rice during the current year, of 47.33 per cent., the figure for the year being 41,267 tons against 78,350 tons in 1925-26 and 83,787 tons in 1924-25. The fall is due to better local crops. The imports of other food grains showed an advance of 48 per cent., the figure for the current year being 28,537 tons against 19,275 tons of the previous year.

COKE.

Imports of this commodity increased by 26.26 per cent., the figure for the current year being 2,308 tons.

DYEING AND TANNING SUBSTANCES.

Imports of dyeing and tanning substances showed a steady and continuous increase, the figures for the past three years being 1,727 tons, 3,528 tons and 6,247 tons respectively. The increase during the current year amounted to 77.1 per cent. over the previous year. 94 per cent. of this commodity consisted of wattle bark imported from Natal for tanning purposes. 670 tons of alizarine and aniline dyes, valued at Rs. 18,22,869, were imported into Madras direct instead of through Bombay as in previous years.

GLASSWARE.

Imports under this head have increased from 11,398 tons in 1925-26 to 16,194 tons in 1926-27, the largest on record and an increase of 42 per cent. over the previous year. The increase was most marked under glass bangles, Germany contributing 50 per cent. and Japan 25 per cent. of the bangles imported. 72 per cent. of the imports of glass sheets and plates came from Belgium.

HARDWARE.

There has been an increase of 12.3 per cent. in the import of this commodity, the figure for the current year being 9,360 tons against 8,335 tons in 1925-26.

LIQUORS.

The imports under this head showed an advance of 13 per cent., the figure for the current year being 4,228 tons.

MATCHES.

5,975 tons by measurement were imported during the year, against 5,262 tons in the previous year, or an increase of 13.55 per cent. over the previous year. A statement showing the imports from the various countries of this commodity during the past two years is given below:—

Year.	Norway.	Sweden.	Germany.	Antwerp.	Japan.	Czecho-slovakia.	Rangoon.	Bombay.	Calcutta.	Others.
1925-26	291	2,011	1,641	385	329	339	201	12	29	24
1926-27	1,634	1,509	482	503	Nil	482	936	129	164	136

PAPER AND STATIONERY.

The imports of these commodities reached the record figure of 18,855 tons, and showed an increase of 5,850 tons, or 45 per cent. over the previous year.

PROVISIONS AND OILMAN'S STORES.

The imports under this head showed an advance of 54.2 per cent., the figure for the current year being 6,575 tons, against 4,264 tons in the previous year. More than 56 per cent. of the total tonnage came from the United Kingdom.

TOBACCO.

The expansion in the manufacture in Southern India of the various brands of cigarettes has accounted for the increased importation during the year of unmanufactured tobacco of 3,214 tons as compared with 2,786 tons in the previous year, or an increase of 15.4 per cent. 96 per cent. of the total tonnage imported came from the United States of America. Imports of manufactured tobacco remained practically the same as last year.

HIDES AND SKINS (RAW).

The imports of this commodity from Ceylon and the Straits Settlements have increased by 24.5 per cent., the figure for the current year being 4,194 tons, the largest on record, against 3,368 tons during the previous year.

MISCELLANEOUS.

During the year under review, imports of soap advanced by 39.7 per cent. On the other hand, imports of Government stores and spices, the bulk of which consists of betel-nuts, fell by 4.7 and 18 per cent. respectively.

EXPORTS—GROUNDNUTS.

The tonnage of this most important staple article which was shipped from this port during the year under review on a larger scale than any other single produce, forming 56.5 per cent. of the total exports of the port, amounted to 163,519 tons, or a slight increase of 371 tons over the previous year, which was a record one. Though the crops were fairly satisfactory, it did not come to expectations on account of the failure of timely rains. The dislocation of continental exchanges, the difficulty in securing easy freights due to the coal strike in England, the political and financial situation in France, the speculative holding by exporters in the hope of getting cheaper freight and higher prices, the supply of other oil-producing seeds as possible substitutes and the fall in prices affected larger shipments being made during the year. Consequently, large stocks remained on hand at the close of the year. Europe took 93.4 per cent. of the total quantity shipped, which was 3.63 per cent. below the previous year's exports. Exports coastwise increased from 4,704 tons to 10,831 tons, or by 130 per cent.

HIDES AND SKINS.

The export of hides (raw) was insignificant. The export of skins (raw), mostly goat skins, has shown a fall of 28 per cent. as compared with the previous year, the figure for the current year being 1,389 tons. Shipment of raw skins to the United States declined by 44 per cent., while those to the United Kingdom increased by 55 per cent. Exports of hides and skins (tanned) also showed a small decrease of 4.63 per cent., the figure for the current year being 15,833 tons consisting of 9,770 tons hides, 3,050 tons goat skins, and 3,013 tons sheep skins, against 16,601 tons in 1925-26. 9,653 tons hides went to the United Kingdom, 80 per cent. tanned skins went to the United Kingdom, and 7 per cent. to the United States of America. Japan took 19 per cent. of the shipment under tanned sheep skins.

COTTON.

The shipment of this commodity, which is second in importance in the export trade of the port, has fallen by 36.2 per cent., the figure for the current year being 16,472 tons, against 25,813 tons in the previous year. A steady fall in prices of American cotton, due to an abnormal and bumper American cotton crop and the late arrival of the Indian cotton crop, coupled with a seven months' strike in Britain, which had the effect of restricting manufacturing activities and the resultant drop and disorganisation of prices in India affected the foreign demand for Indian cotton to a considerable extent and was responsible for a considerable falling off of exports of this commodity. Of 16,472 tons shipped from this port, Belgium took 53.6 per cent., France 15.4 per cent., and Italy 11 per cent.; Japan, China and the United Kingdom taking only 6.2, 4.4 and 4.5 per cent. respectively.

ORES.

There was a fall of 36.4 per cent. in the shipment of this commodity as compared with the previous year, the figure for the current year being 16,184 tons against 25,436 tons of the previous year. The United States of America was the chief consumer of chrome ore. The following table will show the shipment of the several kinds of ores during the past three years:—

	1926-27	1925-26	1924-25
Manganese	—	—	5
Magnesite	11,184	12,815	11,478
Chrome ore	5,000	12,621	11,506
Total	16,184	25,436	22,989

ONIONS AND OTHER VEGETABLES.

There was some improvement in the shipment of onions to Rangoon, Ceylon, the Straits Settlements and the Federated Malay States, the figure for the current year being 16,718 tons against 14,000 tons in 1925-26, or an increase of 19.4 per cent. Shipments of other vegetables, mostly potatoes and tamarind, on the other hand, decreased by 28.65 per cent., the figure for the current year being 2,924 tons.

BONE MANURES.

There was a further heavy fall in the shipment to Ceylon of this commodity, only 642 tons being shipped during 1926-27, against 1,554 tons in the previous year, or a decrease of 59 per cent.

SCRAP IRON.

During the year 500 tons scrap iron and 801 tons pig and hoop iron were shipped from this port. The corresponding figures for the previous two years are given below:—

	1924-25	1925-26	1926-27
Scrap iron...	1,337	725	500
Pig and hoop iron ...	1,362	1,916	801
Iron sleepers	1,561	1,001	—

TOBACCO.

The shipment of raw tobacco increased by 22.45 per cent. as compared with the previous year, the figure for the current year being 7,334 tons by measurement. Three-fourths went to the United Kingdom and the rest to the Straits and Malay States. Shipments of tobacco manufactured have also advanced by 16 per cent., the figure for the current year being 4,382 tons by measurement, a record figure. More than three-fourths of this quantity represents cigarettes.

VEGETABLE OIL.

The shipment of this commodity during the year under review consisting mainly of coconut and groundnut oils showed signs of revival, the figure for the current year being 3,175 tons, against 326 tons of the previous year. Over 45 per cent. went to the United Kingdom.

OIL CAKE.

There was an improvement in the shipment, mostly to Ceylon, of this commodity, consisting of sesamum cake and groundnut cake from 1,638 tons to 3,196 tons, or an increase of 95 per cent.

PIECEGOODS.

Shipments of piecegoods to the Straits, Ceylon, Java, Malay States and Africa continue to show a downward tendency, the figure for the current year being 5,209 tons against 6,076 tons in 1925-26, or a drop of 14.27 per cent. 98 per cent. of these exports consisted of coloured piecegoods, such as sarees, lunghis, Madras cloth and Madras handkerchiefs.

PROVISIONS.

The shipment under this head comprising ghee, pickles, condiments, mostly to the Straits and Ceylon, was 14.27 per cent. better than the previous year's figure, the figure for the current year being 6,961 tons.

TEA.

There has been a steady and continuous improvement in the shipment of this commodity, the figures for the past four years being 1,382 tons, 2,300 tons, 2,675 tons, and 3,062 tons respectively. The major portion went to the United Kingdom.

CASTOR AND OTHER SEEDS.

The shipment of castor seed amounted to 3,466 tons, against 1,023 tons of the previous year. The major portion went to the United States. Shipment of cotton seeds went up from 11 tons in 1925-26 to 738 tons in 1926-27. Shipment of other seeds also advanced from 153 tons to 1,083 tons.

ACETATE OF LIME.

The shipment of this commodity receded considerably, the figure for the current year being 612 tons, against 1,232 tons of the previous year, or a fall of 50.3 per cent.

BUNKERS.

During the year under review 27,930 tons of coal and 23,225 tons of liquid fuel were shipped from this port for bunkers, as compared with 26,357 tons and 15,968 tons in 1925-26 and 24,036 tons and 8,945 tons respectively in 1924-25.

MISCELLANEOUS.

Shipment of manures other than bone manures, increased by 81.7 per cent. Turmeric fell by 31.5 per cent., Government stores by 48 per cent., other textiles by 7.26 per cent., twist and yarn by 48 per cent. and waste by 34.6 per cent.

MATTERS OF GENERAL INTEREST—GENERAL.

(a) The newly constructed petrol pier on the north breakwater was brought into use for the first time on the 13th July, 1926, and the s.s. *Singu* was the first vessel placed alongside this berth for the discharge of her consignment of petrol.

(b) Owing to bad weather in the bay the s.s. *Teesta* had on one occasion to return from Negapatam to Madras to take the English mails for the Far East. A special postal train was worked into the harbour at 5.50 a.m. on Monday, the 8th November, 1926, and placed at west quay No. II., where the vessel was berthed. The vessel arrived at 6.24 a.m. on the 8th November, took on the mails and left the port at 10.13 a.m.

(c) One five-ton and four three-ton electric portal cranes were imported and erected during the year to facilitate the handling of cargo direct from vessels' holds at west quay berths Nos. 1 and 2.

(d) Owing to a stevedore strike at Colombo in February, 1927, several steamers overcarried and discharged here cargo intended for that port pending transhipment.

(e) Another feature of the year under review is the springing up of the trade in opium. Opium intended for French Indo-China was exported from Calcutta and transhipped at this port by vessels of the Messageries Maritimes. The cargo was stored in the Trust's strong room until transhipment was effected.

RAILWAY WORKING.

The railway traffic handled during the year under review amounted to 457,313 tons in 34,417 broad gauge wagons inwards and outwards and 195,633 tons in 29,710 metre gauge wagons inwards and outwards, aggregating in all 652,946 tons. The harbour terminals and the freight collected on the above traffic for the past two years are given below:—

	Tonnage. Tons.	Freight. Rs.	Terminals. Rs.	Tonnage. Tons.	Freight. Rs.	Terminals. Rs.
	527,846	35,51,994	2,29,202	457,313	32,75,921	2,15,395
	184,617	6,81,119	80,895	195,633	7,87,111	93,832
Total	712,463	42,33,113	3,10,097	652,946	40,63,032	3,09,227

SCALE OF RATES.

Only three amendments and additions to the scale, as well as to the statement of services and conditions attached to such services, have been made and sanctioned during the year. These are enumerated below:—

(i) A new rate of three annas per bale for mats, country, in pressed bales.

(ii) A new rate of Rs.1-14-0 per ton on dunnage (mats, bamboos and wood) manifested.

(iii) The pen rate at the iron yard has been altered and a new clause relating to the levy of transit dues on overlanded and excess iron has been added.

At the close of the year a number of other amendments and additions to the scale were considered and submitted to Government for sanction in May, 1927.

ENGINEERING—NEW DEEP WATER QUAY.

Estimate Rs.12,00,000.—The actual work on the quay was commenced early in April, 1926, and the first pile was driven in position on the 20th May, 1926. The total number of piles manufactured to end of March, 1927, was 171, approximately two-fifths of the requirements, of which 78 were made during the year under review. Out of the 71 piles made, 66 were driven by 31st March, 1927, and no difficulty has so far been experienced in driving them to the desired depth. A pile which went down exceptionally easily was tested with a load of 84 tons, inclusive of the weight of the pile, with satisfactory results. The rate of driving has been increased to an average of five completely driven piles for every two working days.

CONSTRUCTION OF A NEW BREAKWATER.

Estimate Rs.9,00,000.—The mass concrete on the breakwater, which was all that remained to complete this work, was commenced on the 22nd July, 1926, at chain 2,247 ft. 6 in. A length of 523 ft., that is, up to chain 2,770 ft. 6 in., was completed by the 31st March, 1927, leaving a length of 480 ft. of work to be done during 1927-28. The soundings taken at the end of the year showed that the silting against the outside of the harbour has become less.

ELECTRIC CRANES AND SUB-STATIONS.

Sub-station " B " and the five electric cranes on the west quay were erected and tested before the close of the year and were brought into use in April, 1927.

The five-ton crane on the south groyne has been erected and the equipment of sub-station " A " is nearing completion.

The aggregate estimate was Rs.8,04,000.

SOUTH REVETMENT.

The South Revetment is almost complete. On the land reclaimed a new combustible shed is being erected. Also the building of two warehouses of an area of 44,800 square feet equipped with railway facilities at an estimated cost of Rs.4,00,000, recently sanctioned, has been commenced.

SOUTH QUAY.

The work of repairing the quay with teakwood beams and decking is nearing completion.

DREDGING.

(a) The suction dredger *Madras* equipped with her new oil fuel burners has been working very satisfactorily. She worked for 126½ days during the year, of which 95½ days were spent in maintenance dredging and the remaining days in capital dredging in deepening the harbour to 32 ft. and on other works.

(b) Dredging statistics.—The table below gives the quantity dredged during the year and progressive totals:—

Particulars.	Unit.	Dredger "Madras." 1926-27	1906-27
1. Quantity dredged	Tons	106,184	4,307,486
2. Working days—(*a*) Dredging ...	No.	126½	4,149½
(*b*) Other works ...	,,	24	153
3. Sundays and holidays	,,	25	1,062
4. Days absent for overhaul and special repairs	,,	181	1,466
5. Days under repairs and weather bound	,,	30	839½
6. Dredged per working day ...	Tons	839½	1,038
7. Rate per ton	Annas	18.98*	8.67
8. Rate per ton, including interest and depreciation	,,	25.43*	12,017

*The high rate this year is due to the short period the Dredger was available for work on account of overhaul and special repairs.

POLICE AND MEDICAL.

The following is a summary of the reports received from the Police and the Medical authorities:—

POLICE.

The value of the property stolen from the harbour premises has decreased from Rs.1,065 to Rs.627-10-0 as compared with the previous year. The total number of cases reported during the year was 60, of which 19 were thefts of articles above Rs.5 in value, 10 petty thefts below Rs.5, and the rest were under other sections of the City Police Act, etc. This compares with 51, 13 and 11 cases, respectively in the previous year. Cases of theft in the harbour have been steadily decreasing year after year owing to more effective supervision by the police officers at the gates and elsewhere in the harbour.

MEDICAL.

716 vessels arrived here from plague-infected ports with crews numbering 73,599 and 90,023 passengers, against 674 vessels with crews numbering 61,577 and 73,437 passengers during the previous year. 286 vessels with crews numbering 29,751 and 78,327 passengers were inspected and granted bills of health, against 279 vessels with crews numbering 27,589 and 39,287 passengers in the previous year. There were one case of chicken pox, three cases of suspected cholera, four cases of mumps, one case of acute pneumonia, one case of dengue, and two cases of influenza on steamers that entered the harbour during the year. The cases of chicken pox, acute pneumonia and suspected cholera were sent to the infectious disease hospital for treatment. The disinfection of bedding and clothing of deck passengers and crews landing at and embarking from the port was continued in the disinfection shed in charge of a sub-assistant surgeon. A nurse is employed for the examination of female passengers. No unusual mortality of rats was reported on any of the vessels that entered and left the harbour during the year. The Clayton disinfecting apparatus was maintained in the port.

MANAGEMENT.

The committee appointed in the previous year to consider certain proposals relating to the working of the Port and the Pilotage departments, met during the year and submitted their

recommendations on those proposals not dealt with at the close of the previous year. At the end of the year the Board appointed a committee of its number for the consideration of certain amendments to the Trust's scale of rates, but the committee did not meet until after the end of the year under review.

During the year the chairman, Lieut.-Colonel Bradford Leslie, was the recipient of the honour of Knighthood and M.R.Ry. Rao Bahadur M. Balasundaram Nayudu Garu was promoted to Diwan Bahadur.

Staff.—Sir Bradford Leslie, Kt., O.B.E., M.Inst.C.E., M.I.E.E., continued as chairman throughout the year.

Commander H. A. B. Digby-Beste, O.B.E., R.I.M., was Deputy Conservator of the Port till 11th January, 1927, when he proceeded to Bombay to take up the appointment of Port Officer of that port. He was succeeded by Commander P. C. H. Lane, R.I.M., on 25th January, 1927. During the interval Mr. A. Mackenzie, Senior Harbour Master, officiated as Deputy Port Conservator.

During the year Mr. J. G. Lord continued as Traffic Manager, Mr. S. Narayana Ayyar, M.A., as Chief Accountant, and Mr. J. L. Pinto as Office Manager.

Recent Legal Decisions.

WORKMEN'S COMPENSATION: HARBOUR RISKS.

As one of the judges in the case remarked, the result of the decision of the Court of Appeal in *Robertson v. Anglo American Oil Co.* (1927) may very seriously restrict the benefit which the Workmen's Compensation Act gives to sailors. Stated shortly, the facts were these. Two seamen, legitimately ashore for recreation, did not return to their ship by the launch provided by their employer at 8 p.m., but, at 10 p.m., took a boat which they found on the beach, and, in endeavouring to row to the ship, were drowned, by reason of the boat taking in water and upsetting. Upon a claim by their dependants for compensation, it was held that, there being no duty upon the men towards the employers to return in the manner chosen, and the means selected by them for transit not being provided by the employers, the men were not in the course of their employment, and their dependants were not entitled to compensation.

It may be here noted that the question of disobedience to orders does not now enter into a case of this kind, for, by the Workmen's Compensation Act of 1925, an accident which would otherwise be held as happening in the course of the employment, is not taken out with the employment by reason of the fact that the workman at the time the accident happened was acting in contravention of orders given by his employer.

The importance of the question involved is obvious, for it cannot be disputed that the risk of reaching his ship by water in a boat is one of the characteristic and special risks of the employment of a sailor. Everybody knows that sailors who have to carry on business on a ship, whose duty it is to be afloat as a rule, may find themselves, when they reach harbour with their ship, sometimes moored to a quay or a wharf or a pier, but very often the ship lies afloat, not attached to the quay or pier or land, by any material substance such as a bridge or a gangway. The ship may be lying moored in a dock. It may be lying anchored in a harbour. It may be lying in a river. It may be lying in a port, or it may be lying in a roadstead some two or three miles away from the shore; and so there is the characteristic and special risk incidental to the employment of a sailor of getting to his ship and from his ship by boat.

What, then, is the position of a sailor in those circumstances? His employment is of a continuous nature. To that extent it more nearly approaches the employment of a domestic servant than does the ordinary day worker or industrial worker whose employment is limited to certain working hours, and who, after the expiration of those hours, is not employed by his employer or employed at all. The sailor's contract of service is a continuous service, but it has been well established now that though the employment is continuous, it is suspended while the man is on shore for his own purposes, even though he is the employee meanwhile.

Now, a sailor, when his period of leave is at an end, is no doubt under a duty to return to his ship, but the mere fact that he is in the course of returning to his ship is not of itself sufficient. That is quite plain. A man may have left his music-hall, or whatever it may be, and be travelling by tram in the direction of the dock or quay where his ship is moored, and yet will not have ceased to have his employment suspended. He will not, within the words of Lord Sumner in *Hewitson's Case* (1924) have returned to that sphere in which his employment operates. But, on the other hand, when he reaches the access to or the means of access to his ship, he will, according to the decisions, have reached his sphere where his employment operates, and therefore, where a ship is moored against the quay or a wharf, and the workman has reached the gangway where he approaches the ship, he then is said to have reached the sphere in which the employment operates, and it has been dcided on the same principle that, where the ship can only be approached by passing over another ship or another two ships, that is to say, when a ship is lying in a tier, that the sailor has reached the sphere of his employment when he has approached the gangway which leads to the first ship. A case in which that was decided in Scotland went still further, because it was there held that the seaman had reached the sphere of his employment where he had made a mistake as to the access to his ship and had reached a gangway which led to another tier, the adjoining tier to that leading to his own vessel, such a finding would indeed seem to be essential to giving the full area or complement to the sphere of a man's employment, for it constantly happens that a sailor—and a bargeman is in the same position—gets to his work from the shore by going over one, two or three barges; sometimes he has to travel from one barge to another while the barges are actually in course of transit in a train of barges.

But then, it may be added, that while such a rule is perfectly right and proper when the man is proceeding to the ship by a material means of access, a fixed means of access, such as a gangway or a floating bridge, it becomes different when he has to get into a boat to get to the ship, as, for instance, where a ship may be moored in a dock, as it sometimes is. If a man could get a gangway that would reach twelve yards to the ship, he would have reached the sphere of his employment immediately he set foot on the gangway, but if he had to take a boat and scull himself to the ship twelve yards away, then he would not reach his sphere of employment till he touched his ship.

That seems to be a very narrow distinction, and the point in *Robertson's* case was whether that distinction is correct in law. The question may be tested in other ways. Would the man have been within the sphere of his employment had he used the ship's boat? We gather from the authorities that he would not be unless, not only did the ship provide a boat, but the man was bound under his contract of service to use that boat; and that again would mean in this case that the seaman would not in fact have been within the sphere of his employment even if he had used the ship's launch, because it was plain on the evidence that he was not bound to use the launch.

In support of the fine distinction between such access to a ship as is afforded by a bridge or a gangway and access to the ship that is provided by transit in a boat, it may be said that when a man is proceeding from the shore to the ship he is merely in the same stage of his journey as he would be if he were travelling from a starting point by tram or train to the quay. He makes the transit in two stages, neither of which is complete until he has in fact got to the ship, and by the time he has got to the ship, apparently then, if he is travelling by boat, he is not within the sphere of his employment until he has put his hand on the ladder or rope by which he gets from the boat to the ship.

The Court was faced with difficulties in *Robertson's* case by reason of prior decisions which dealt with the question of transit of ordinary industrial workmen from their homes, where they certainly were not in employment, to the factory or mine or other place where they work. The two last and most recent of these cases arose in respect of a train provided by a colliery company which had taken some workmen—the workmen, in other words, who found it convenient to use it—from their place of residence, in one case six miles away from the man's home, to a mine, and in those cases it was held that that being a facility provided by the employer which the workman was not bound to accept, and unless he was bound to accept it, he could not, in using it, be said to have reached the sphere of his employment.

Those cases, however, might be entirely correct without at the same time going so far as to govern such a case as *Robertson's*, for there is a clear distinction between conveying a person from his residence by land, when there obviously are many alternative ways of getting from it, and where there are not special risks incidental to a journey to a factory, and a case like a sailor where he ceases to be on land and embarks on the water for the specific purpose, and the only purpose, of reaching his ship.

But in the last case on the subject, the case of *Newton v. Guest, Keen and Nettlefolds, Ltd.* (1926), one of the cases where a miner was travelling to his work by train, the test stated by the Lord Chancellor was this: "The question is, was it the duty of this man—the duty to his employer under his contract of service—to go to this platform and to travel by this train?" Applying that test to *Robertson's* case—was it the duty of these seamen to go to this waterside and travel by this boat—the Court returned the answer that it was not their duty to travel by the particular boat used. It was the permitted means of access, but it was not their duty to travel by it; they might have travelled by any other boat; they might have travelled by the ship's launch. As above stated, they came to the conclusion that the men were not in the course of their employment.

D. MACKAY.

The Port of Dieppe.

Its Facilities and Equipment.

The Port of Dieppe, latitude 49 deg. 55 mins. 34 secs. 5 North, and longitude 1 deg. 4 mins. 42 secs. 2 Eact of Greenwich, is the nearest French port to Paris. It has the principal quality of a large seaport being deep and absolutely safe. The roads extend to about 5 kilometres, approximately three miles beyond the outlet of the entrance. There, vessels find good anchorage on a chalk bottom covered with sand, although it is not sheltered from sea winds.

There is 6 metres or 19 ft. 6 in. of water at low tide at a distance of 650 yards from the shore and 8 metres or 26 ft. at 1,600 yards. Time of high water at Dieppe may be computed by subtracting about three hours from the figures of the London Bridge tide tables. Heights of water above zero of the charts are as follows:—Ordinary spring tides, high water 9 metres 17 cms.; high water, 7 metres 12 cms.; lower water, 2 metres 36 cms. Nominally, there is no slack water, but the time elapsing between the flood and the ebb tide can sometimes make a difference of a few minutes according to the kind of tides.

TOPOGRAPHY.

The entrance heads N.N.W., and has a breadth of 100 metres, 328 ft., between the pierheads. Two converging piers mark the limit of a zone of evolution for the two vessels. This zone has an area of 27 acres, the greatest part of which is deepened to 13 ft. below the zero of the marine charts. The distance between the entrance channel and the beginning of the inner channel is 420 metres.

The inner channel, slightly curved, is 400 metres long and 75 metres broad. Its depth is four metres or about 13 ft. 1 in. below the level of the zero of the marine charts, so that there is about 36 ft. at high water, the ordinary neap tides and about 42 ft., ordinary spring tides.

The outer or stranding harbour has an area of 14 acres for accommodating vessels; an effective quayage of 870 metres; and landing and storage space of 10,000 square metres. The outer harbour is also deepened to four metres, about 13 ft. below the zero of the marine charts. The inner harbour is of a total surface of four hectares, a quay length of 150 metres and a quay space of 3,500 square metres.

The inner harbour communicates with the outer harbour by the Pollet Channel, which has been dredged 1m. 50 lower than zero on the marine charts.

The Fish Dock has an area of 9,400 square yards. It has a depth of zero on the marine charts and communicates with the harbour by the Duquesne lock.

The channel, the outer and inner harbour of which give access to the docks through the channel, have sufficient depth that ships may find there seven metres or 23 ft. of water during neap tides at high water and nine metres or 29 ft. during spring tides at high water.

DOCK ACCOMMODATION.

Dieppe Harbour has four wet docks, viz., Duquesne Dock, Bérigny Dock, Canada Dock, and Paris Dock. The dimensions of these docks are as follows:—Retenue Dock Gates: Breadth 16m. 50; height of lock sill above zero on charts, 1m. 62; lock sill, ordinary neap tides, 5m. 40; ordinary springs, 7m. 45; extraordinary springs, 8m. 25. Berigny Dock Gates: Breadth, 14m.; height of lock sill above zero on charts, 2m.; lock sill, ordinary neap tides, 5m.; ordinary springs, 7m. 05; extraordinary springs, 7m. 85. Canada Dock (N.) and (S.): Breadth, 18m. 18m.; height of lock sill above zero on charts, —1m., 0.00; lock sill, ordinary neap tides, 8m. 7m.; ordinary springs, 10m., 05, 9m. 05; and extraordinary springs, 10m. 85, 9m. 85. There is in each case 12cms. to be deducted on account of thickness of chains on the lock sills.

The Duquesne Dock has an area of 6.78 acres and communicates with the inner harbour through the Retenue Dock Gate and with Bérigny Dock through the Bérigny Gate. The Paris Dock communicates with the Canada Dock, which opens in the inner harbour.

The docks are deepened to the same levels as the dock sills. The docks are open to steamers and sailing vessels at all day and night tides, except Bérigny Dock, where vessels can only enter at the day tides.

The outer length of the quays of the docks is about 3,000 metres, and the total area for goods is about 140,000 square metres. The maximum accommodation in the harbour and its warehouses is approximately 250,000 tons, of which 130,000 is public and 120,000 tons private.

TIDAL SIGNALS.

Tidal signals are shown at all day tides on the usual mast at the west pier and on the Pollet Cliff. A white flag surrounded with blue indicates that the docks are open.

PILOTAGE.

Pilotage dues are fixed by Decrees, of which the following is an extract:—

Act 167. French vessels belonging to the Mercantile Marine and foreign vessels auxiliary to French ships, pay pilot dues when they enter the Port of Dieppe with cargo, in proportion to the legal tonnage of the vessel as shown by their Gauge Certificate at the rate of Fr.0.72 per net register ton. The charge for outbound pilotage is half that amount.

Vessels having merchandise on board to the amount of at least one-sixth of their registered tonnage pay the same pilotage as those which are fully loaded.

Steamers are always considered as loaded and pay half the pilotage due from sailing vessels in conformity with the Ordinance of August 19th, 1841.

Pilots are also entitled to supplementary fees as follows:—

For vessels entering the Duquesne or Canada Dock, 12 francs; and for Bérigny or Paris Dock, 15 francs.

They are further entitled to six francs and nine francs when leaving these respective docks. Every foreign vessel entering or leaving the docks is bound to take a pilot.

Vessels belonging to the Navy and all others fitted out as men-of-war or for deep-sea fishing are considered loaded. Foreign vessels not auxiliary to French ships pay half as much again in pilot dues.

Vessels signalling for a pilot during the day-time hoist at their mizzen mast a white flag bordered with blue or their national flag. At night they set off rockets or light a torch, or show a white light at intervals of five minutes.

STEAM CRANE EQUIPMENT.

Movable steam cranes, belonging to the Chamber of Commerce, are set on the south quay of Bérigny and Duquesne Docks, the Quebec quays of the Canada Dock and the Norway quay of the Paris Dock. They can lift from 1,500 to 5,000 kilograms, and are fitted with tubs or patent grabs which permit of the rapid discharge of colliers. For cranes lifting 1,500 to 2,000 kilograms a charge of 162 francs per day is made and 180 francs on Sundays. The charge per day for cranes lifting 2,001 to 5,000 kilograms is 180 francs and 200 francs on Sundays.

ELECTRIC CRANES.

Four electric cranes on overhead travelling platforms with 10 ton hopper and two travelling platforms with 20 ton hopper are located on the quay du Maroc. The cranes are fitted with patent grabs lifting about 2½ tons, and are in special demand for handling large coal. On the Quai des Indes are four electric cranes of 2,500 kilograms on overhead travelling platforms, and are mainly used for discharging oil seed, timber and sundry goods. A charge of 300 francs per day and 330 francs on Sunday is made for the use of the electric cranes, and 5,000 kilograms capacity on overhead travelling platforms and with 10-ton hopper. For those with a 20-ton hopper an extra charge of 48 francs per day is made and 55 francs on Sundays. A charge of 28 francs per regular working hour and 35 francs on Sundays is made for the electric cranes of 2,500 kilograms on overhead travelling platforms, with extra rates in the early morning, mid-day and evening, and 40 francs an hour at night.

There is also an electric crane of 30 tons capacity mounted on the Tonkin Quay and used for loading and unloading miscellaneous cargo and for masting and dismasting vessels. On the Quebec and Norway Quays are 13 electric capstans for moving railway trucks.

LIGHTING OF QUAYS.

All quays fitted with steam cranes are illuminated either by gas or electricity as required. There is a tax of 6 francs 50 centimes per evening for ships loading or discharging, and after 8 p.m. 1 franc 30 centimes for every quarter of an hour.

PUBLIC WHARVES.

Public wharves granted to the Chamber of Commerce and managed by the Compagnie des Entrepôts et Magasins Généraux of Paris are situated west of the Paris Dock. The area available is 7,000 square yards.

WARRANT WAREHOUSES.

At the Paris Dock are also premises maintained by the Bonded and Warrant Warehouses Company of Paris. A customs bonded warehouse for receiving all goods subject to duty and authorised as a public storehouse is located at the Norway Quay.

PROTECTION OF MERCHANDISE.

A corps of day and night sworn watchmen working under the control of the Chamber of Commerce is available for the protection of goods either during the discharge of ships or when merchandise is on the quay or in course of transit in vehicles.

Dangerous or inflammable materials can only be landed at the India Quay of the Canada Dock, or in Bérigny Dock, and then only in containers and of a quantity not less than 30,000 litres. A fire watch service works under the direction of the harbourmaster.

Five weighbridges for cars up to 10 tons have been built on the quays by the Chamber of Commerce and for weighing cargoes.

Railway track along the quays is in direct communication with the station of the State Railway Company, and has a total length of 26 kilometres. Chalk rubbish from quarries and shingle are mainly used as ship ballast at Dieppe. Vessels, however, frequently load blue flints either as ballast or cargo, the former being utilised in the manufacture of stone and earthenware and the latter for lime burning.

Water supply for the use of ships is furnished by the Municipality of Dieppe, and is available from 33 pipes situated along the quay of Fish Dock and other docks.

The harbour is provided with a dry dock of the following dimensions:—

Breadth of entrance on the sill 18 metres; on the upper part 21 metres 16 cms.; length upon stocks 97 metres 50 cms.; greatest length 110 metres; height of the entrance sill 1 metre.

CAREENING GRIDIRON.

A careening gridiron 200 ft. long and 42 ft. broad with stocks at 10 ft. above zero is situated alongside the Guynemer Quay. The building and repair of boilers, engines, wooden and iron hulls is undertaken by a number of private yards. Vessels coming from countries which may be under sanitary ban for the time being are fumigated by apparatus owned by the Chamber of Commerce.

TRADE OF PORT.

The trade of the port during 1925 was as follows:—

	Vessels.	Registered Tonnage.	Tons of Goods.
Inwards	1,438	805,790	452,215
Outwards	1,440	807,066	125,465
Totals	2,878	1,612,856	577,680

STEAM SHIP LINES.

A regular service for passengers between Paris and London runs twice a day between Dieppe and Newhaven, the average passage being made under three hours. Three of the seven large mail boats employed belong to the State Railway Company. The boat station is connected with the main station by a special line, whilst an underground passage is used for going on board the mail boats at low water.

Two regular lines of cargo boats convey merchandise between England and France. One between Newhaven and Dieppe belongs to the Southern Railway and the French State Railway Company. The other steamship line, operated by a private company, links Dieppe with Grimsby. There are also two lines between Teneriffe, Las Palmas (Canary Islands) and Dieppe, principally carrying fruit cargoes.

RAILWAYS.

The two railway routes connecting Dieppe Harbour with Paris proceed respectively by way of Rouen and Pontoise, the distance to Paris being in the first case 201 kilometres, and in the second, 168 kilometres. Dieppe is also connected with the North of France by the line from Dieppe to Eu and Abbeville. The distance from the port to the following towns is as follows:— Amiens, 119 kilometres; Dijon, 483 kilometres; Lyon, 675 kilometres; Nancy, 486 kilometres; Orleans, 289 kilometres; Paris via Rouen, 201; via Pontoise, 168; Rouen, 61; and Tours, 402.

The port is also connected by telephone with the rest of France and abroad.

A floating dry dock, having a length of 49 metres 40cms. on the stocks, 10 metres 56cms. inner breadth between the plates, and a lifting power of at least 100 tons and 1,000 kilograms has been temporarily anchored at the south-west end of the Paris Dock.

LIGHTHOUSES AND LIGHTS.

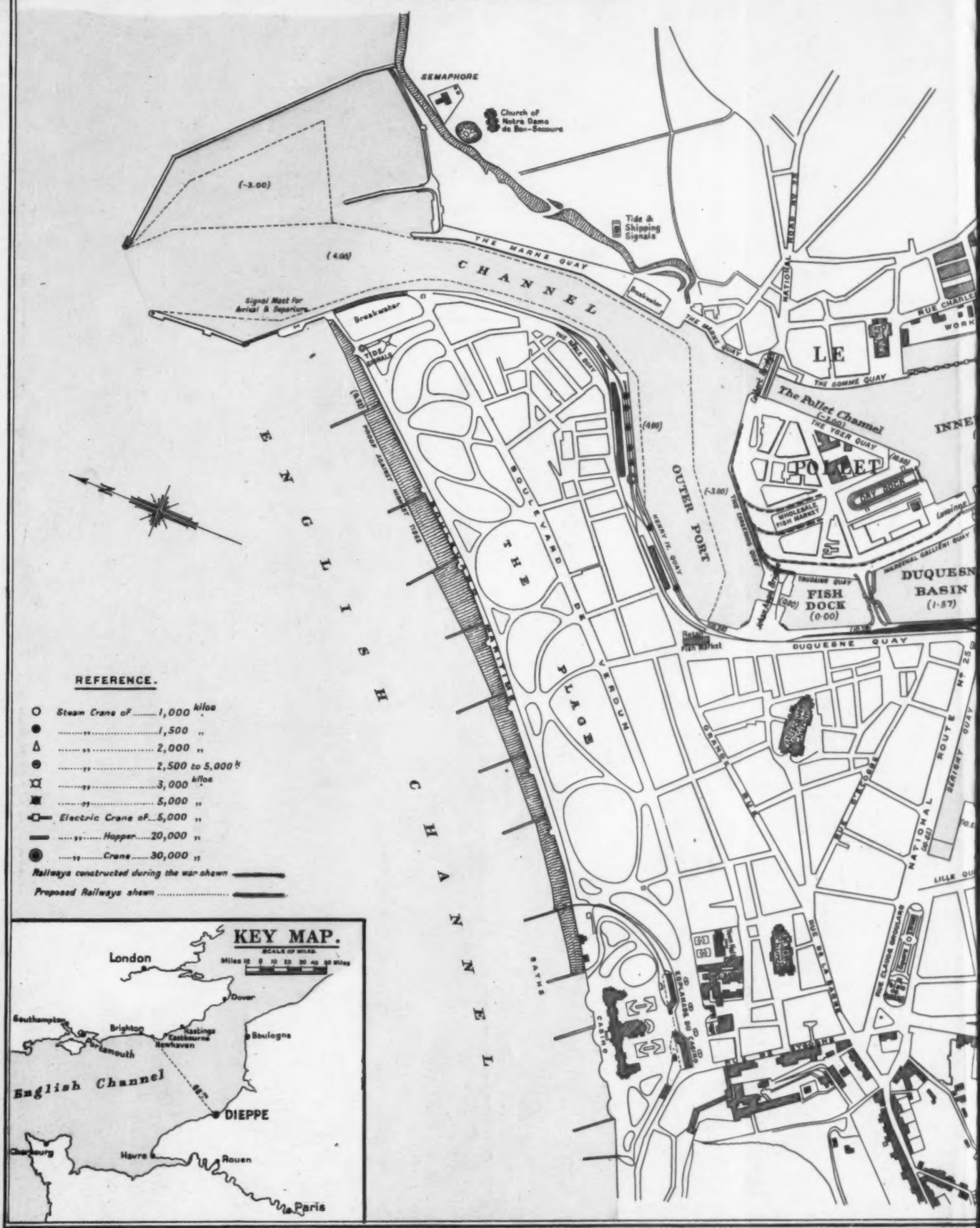
There are lights at the end of the east and west jetties. That at the former, housed in a metal tower painted white, is a fixed red one, and is visible three miles away in ordinary weather. The light on the west jetty is located in a metal tower painted white with a square base, and is white with a green arc occulting regularly every four seconds. The white and green lights of 5,000 and 375 candle-power are respectively visible 12.5 and 9.5 miles away in ordinary weather. In foggy weather a horn blast is sounded from the west jetty lasting three seconds, with intervals of 27 seconds. The D'Ailly Lighthouse on the Point of that name is an octagonal tower housing a flashing white light of 400,000 candle-power and visible in ordinary weather 24.5 miles away. There is a triple flash every 20 seconds with an eclipse between each flash of four seconds, and between groups of flashes, 12 seconds. A compressed air siren is fitted on the upper gallery of the lighthouse. In foggy weather, this syren gives one blast lasting three seconds, which alternates every 90 seconds with a group of two blasts of three seconds duration and separated by an interval of three seconds.

A Recent Aerial Photograph of the Barry Graving Dock, Barry, South Wales.

PORT OF DIEPPE.

UNDER THE JURISDICTION OF THE STATE & THE CHAMBER OF COMMERCE, DIEPPE.

ENGINEER;— M. AUTRAN.



REFERENCE.

- Steam Crane of ..... 1,000 kilos
- ..... " ..... 1,500 "
- ..... " ..... 2,000 "
- ..... " ..... 2,500 to 5,000 k
- ..... " ..... 3,000 kilos
- ..... " ..... 5,000 "
- Electric Crane of ... 5,000 "
- ..... " ..... Hopper ..... 20,000 "
- ..... " ..... Crane ..... 30,000 "

Railways constructed during the war shewn

Proposed Railways shewn

WARD & FOXLOW, Harcourt St, Marylebone, W.

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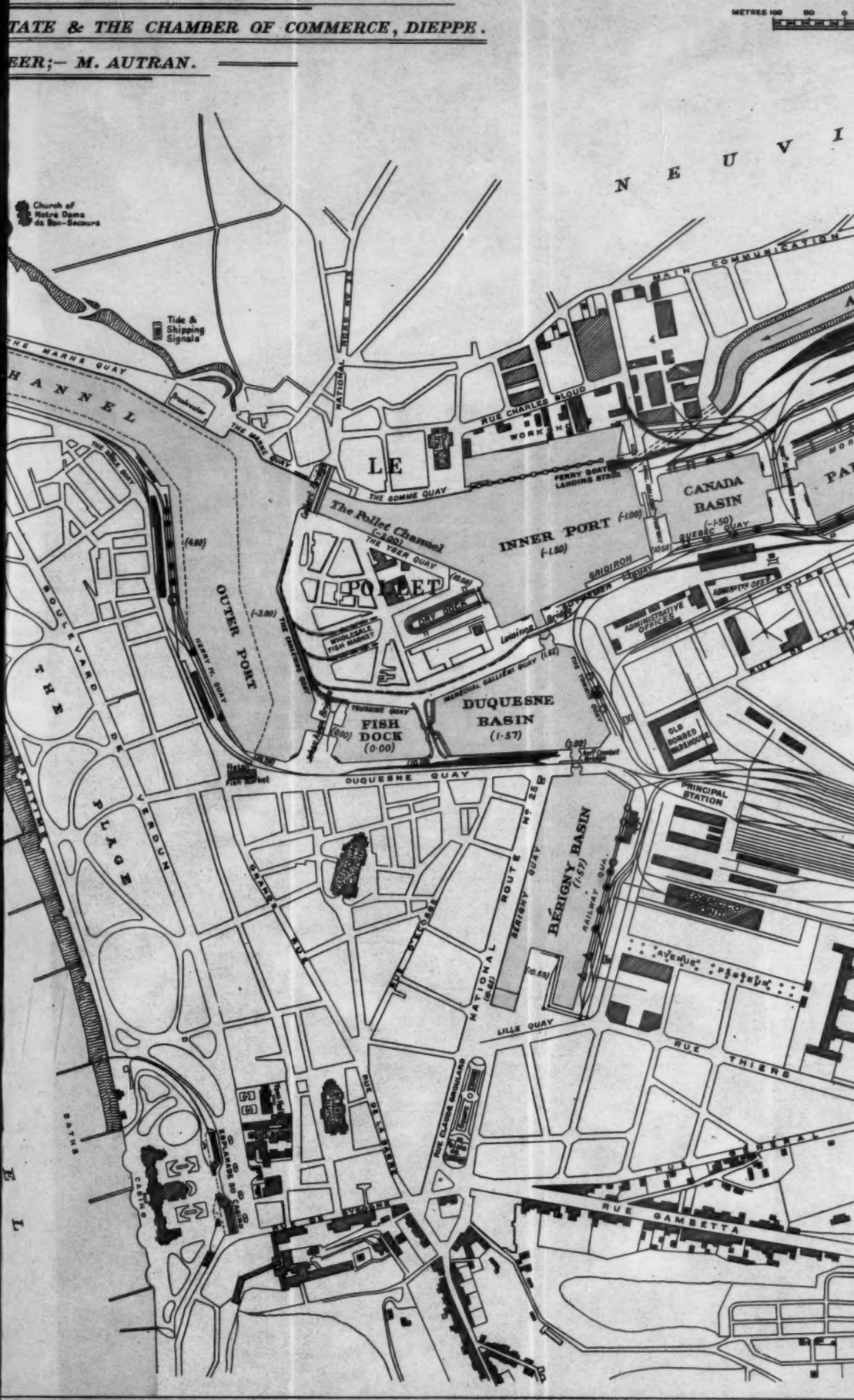


WARD & FOXLOW, Harcourt St, Marylebone, W.1. 5005

IORITY – NOVEMBER, 1927.

Harbour Engineering Notes.

COMMERCIAL LACQUER.

The progress made during the war in the application of cellulose solutions to the protection of aeroplane fabrics, without which flying in all weathers would have been impossible, has led to investigations as to the adaptability of these solutions to peace-time purposes, with the result that cellulose solutions have recently been made available for a very wide range of purposes in industry. One of the chief outlets is found in motor body building, the completed coachwork being sprayed with the solution, which is now made in any colour or as a clear solution. The finish, which is dry in half-an-hour, is excellent, and it will not scratch or tarnish. Furniture manufacturers are also using the clear solution on the highest grade material with very good results.

High grade dipping lacquers may be applied to any metal surface without affecting its colour or finish. They are quick drying, and the coating produced, though practically invisible, even on silver, is an efficient protection against tarnish and corrosion.

Though application by spray usually gives the best results, brushing lacquers are also available. This brushing lacquer is quickly and easily applied, and produces a hard, durable and glossy finish.

PURE IRON SHEETS FOR INDUSTRIAL BUILDINGS.

It has been known for some time that the purer the iron the more resistant it is to corrosive influences, such as are found in the chemical, coal mining and coke oven industries, and galvanised sheets of commercially pure iron have been employed since the war for various constructional purposes, the purity of the metal used ranging as high as 99.84 per cent., i.e., containing only 0.16 per cent. of elements other than iron. As the result of recent experiments commercial pure iron sheets are being manufactured for constructional and other purposes, in which the purity of the iron is 99.75 per cent., alloyed with 0.4 per cent. copper and 0.07 molybdeum, and it is claimed that this material is very much superior to the commercially pure iron for resisting corrosion.

Samples of both metals, submerged in 10 per cent. solution of hydrochloric acid, showed that after five weeks, the pure iron had lost 48.4 per cent. of its weight, while the copper molybdeum iron had lost only 2.8 per cent. In a similar test with copper-bearing steel, the steel lost 52.7 per cent. of its weight after four weeks, while the copper molybdeum iron lost only 1.9 per cent. The tensile strength of the new alloy is stated to be 66,600 lbs. per sq. in., as compared with 44,480 for pure iron and 58,125 for copper bearing steel.

NICKEL COPPER ALLOY.

It has for long been known that nickel copper alloys containing from 60 to 70 per cent. nickel possess mechanical and chemical properties of a very high order, and are in consequence of considerable potential value in engineering. Unfortunately, many commercial alloys have been produced containing various proportions of impurities, with the result that their behaviour under almost uniform conditions has been erratic. Most of these troubles seem to have been overcome, however, by the development of an alloy of nickel and copper with a small percentage of manganese.

An average of forty heats of this alloy gives the following analysis:—Ni, 68.87; Cu, 25.82; Mn, 3.90; Fe, 0.65; C, 0.045; Si, 0.162. Such an alloy combines a high tensile strength with considerable malleability, ductility, toughness and resistance to shock. On hot roller rods direct from the mill, the following figures were given:—

Yield point, lb. per sq. in., 39,650.
Max. stress, lb. per sq. in., 90,496.
Elongation, 45.9 per cent.
Reduction of area, 67.6 per cent.
Brinell hardness, longitudinal section, 149
Brinell hardness, transverse section, 149.
Izod impact tests, ft. lb., 110.
Specific gravity, 8.72.
Co-efficient of thermal expansion, 0.0000161.

The values for mechanical strength of this alloy are retained when it is worked at temperatures much above normal, and, it is claimed, from 200 to 300 deg. Fahr. higher than those at which nearly all other non-ferrous metals and alloys break down. Comparative tests between the nickel copper alloy and other commonly used commercial non-ferrous alloys show that high strength brasses, phosphor bronze, gun-metal and similar alloys all show a serious and similar loss of strength when tested under temperature conditions of 570 to 670 deg. Fahr., whereas nickel copper, even at 750 deg. Fahr. shows no diminution of ultimate tensile strength and only a very slight lowering of the yield point.

Nickel copper alloy is highly resistant to corrosion, particularly corrosion arising from exposure to atmosphere and sea water. It also resists common acids and alkalis better than most non-ferrous alloys, as well as ammonia, either in aqueous solution or as a gas, caustic alkali or carbonate solutions, alcohol, and photographic materials.

This alloy also possesses useful electrical properties and may be used as a resistance material in the form of rods, wires and tapes. Its specific resistance is slightly over two microhms per cu. cm. Its temperature co-efficient of electrical resistance is higher than some other alloys of the commercial nickel-copper type.

Nickel copper is best forged or hot rolled at 1,800 to 1,900 deg. Fahr., and after such hot working it can be readily drawn into rods or wire, or cold rolled into sheets. Annealing is carried out in tight pots to prevent oxidation and scaling as far as possible, as the scale is somewhat refractory. The most suitable annealing temperature is about 1,500 deg. Fahr. The alloy is fairly easily machined, either dry or with one of the usual lubricants. High speed tools must be used for this work. It can be produced in a large number of forms, such as sheets, plates, bars, rods, round or square billets, cold rolled into wire rods, sheets and bars and cold drawn into wire, seamless tubing, welded tubing, washers and pipe fittings.

VOLTAGE REGULATION IN POWER STATIONS.

Voltage regulation is one of the most important aspects of power station management, whether the plant is supplying the public or a private industrial undertaking. As far as lighting service is concerned, the importance of obtaining a steady voltage can hardly be over-estimated, both from the consumer's and the supplier's point of view. The modern high efficiency carbon or metallic filament lamp requires well-nigh perfect regulation to enable really good results to be obtained, and it is a well-known fact that a variation in voltage of only two or three per cent. is sufficient seriously to impair the life and candle power of the lamp. From actual tests it has been shown that if the voltage is increased only 1 per cent. above normal, the life of a carbon filament lamp is reduced to 80 per cent. of normal, while at the same time the candle power is increased by only 6 per cent.

Motors, running on a supply circuit, are greatly affected by voltage regulation, as they can only be run at their maximum efficiency on a steady voltage.

Many power plants have hitherto relied on hand regulation, but this method is unsatisfactory on account of the uncertainty of the human element and also because of the time lag which is inseparable from this type of control.

During the past few years, however, a device has been invented which will automatically and instantaneously regulate the voltage of either alternating or direct current generators. This regulator can be built either to maintain the bus bar voltage constant or to compensate for line drop to some distant point in the system and thereby maintain a constant voltage at that point. In addition the regulator can be used for holding the speed of a motor constant or controlling flywheel motor generator sets.

The instrument (Tirrill patents) consists essentially of a differentially wound relay magnet and a main control magnet, the terminals of which are connected to that part of the circuit where a constant voltage is to be maintained. The latter magnet has an adjustable core at the bottom, with a movable core above. The movable core is attached to a lever operating the main contacts, the pull being opposed by a spring which tends to keep the main contacts closed. The relay magnet has a U-shaped core, and its armature operates the contacts that open and close a shunt circuit across the field rheostat. One of the differential windings is permanently connected to the bus bars or some other convenient source of supply, and the other is connected to the same source of supply through the main contacts.

In operation, the instant the voltage falls, so the current and the pull exerted by the control magnet are reduced. The spring is then able to close the main contacts, which complete the circuit of a relay coil, thus short circuiting the field rheostat. The current in the field immediately begins to rise at a very rapid rate, and the voltage also rises in a corresponding manner. Sufficient current is then caused to flow in the control magnet to overcome the spring. The main contacts are then immediately opened, and the field rheostat, which is set to maintain only about 60 per cent. of the normal voltage, is left in series with the field. The voltage then begins to drop, when the main contacts again close and the cycle is recommenced. The rate at which these operations take place is exceedingly rapid. In this way the voltage is automatically kept constant, and the instrument requires very little attention, all that is necessary being the occasional cleaning of the relay contacts.

PORT DUES AND CHARGES AT HELSINGFORS.

The Department of Overseas Trade has received from His Majesty's Consul at Helsingfors a statement of charges incurred by vessels discharging and/or loading and goods landed at that port.

Details of the various charges have been circulated to steamship owners and brokers, forwarding agents, etc., on the Department's Special Register, and copies may be obtained by companies of British origin, capital and control upon application to the City Office of the Department (Shipping and Transport Section), 73, Basinghall Street, London, E.C.2.

Hawaii Harbour Commissioners.

More Shipping Calls and Larger Revenue.

The Annual Report of the Board of Harbour Commissioners of the Territory of Hawaii for the financial year ended June 30th, 1926, shows that revenue amounted to $414,752.62 compared with $372,688.88, an increase over the previous year of $42,063.74.

This large increase in revenue is accounted for by constant increase in shipping calling at ports of the Territory, and corresponding increase of tonnage and usage of Territorial terminal facilities.

Increase of revenue by ports is as follows:—

Honolulu	$13,546.65
Hilo	1,836.01
Kahului	25,547.58
Port Allen	198.50
Ahukini	935.00
	$42,063.74

Toll charges on freight passing over Territorial wharves during the fiscal year ending June 30th, 1925, amounted to $112,960.26; this year's revenue from the same source is $132,583.90, an increase of $19,623.64. The remaining increase of $22,440.10 is accounted for by increased use of Government plant and equipment.

Expenditure amounted to $1,017,785.14, $225,720.00 from current funds and $792,065.14 from loan funds for public improvements, the details of which are covered in the report.

ISLAND OF OAHU AND ALOHA TOWER. PIERS 8, 9, 10 AND 11.

The original plans and specifications for this tower, which has been officially designated as "Aloha Tower," have been considerably modified from time to time, the most important of which was to increase the height one additional storey or 12 ft., which greatly improved the appearance of same, and making the height from the ground to the top of the concrete 184 ft. 2 in., on top of which is a metal flagstaff 40 ft. high, upon which a time ball 14 ft. in diameter operates.

The entire outside, except the top of dome, is plastered with buff coloured California stucco. The dome is plastered with cement plaster, coloured green, and with the sash painted green, it makes a very attractive appearance.

The clock, with a face on each side of the tower, has been installed and is now in operation.

The Board of Harbour Commissioners has granted a revocable license to the Lighthouse service for the installation of a light on top of the tower on the harbour side. This light takes the place of the old Honolulu Harbour light, which was discontinued when this new light was put in operation on July 1st, 1926. This light is electrically operated, with gas tank connections in case of emergency, such as having the electric current shut off. The light shows through an angle of 180 degrees and is visible nineteen miles at sea, and is not visible on the shore side.

This structure provides excellent offices for the Harbour Master and pilots, and provides an excellent lookout room for observing the approach and departure of vessels and the general activities around the harbour, and besides being a utility well adapted to the needs of the harbour front officials, it is also very ornamental and fits in excellently with the large pier developments.

KEWALO BASIN WHARF AND DREDGING.

This project was completed during this period at a total cost of $128,985.45. The wharf, as completed, is of reinforced concrete 25 ft. wide and 450 ft. long, with a large filled area back of same giving ample room for the handling of traffic. As soon as water lines, gasoline and oil facilities are provided, for fueling the sampans, they will all be removed from Honolulu Harbour and use Kewalo Wharf exclusively for the handling of their fish. This basin will also provide a safe anchorage for pleasure boats.

OIL IN THE HARBOUR.

During this period considerable oil has found its way into the harbour from several sources, but accidental in most cases. A constant lookout is being kept of all violations in connection with spilling oil into the harbour. The harbour being landlocked, with very little rise and fall of the tide, it is difficult to remove the oil when once it is spilled.

DREDGING HONOLULU HARBOUR.

The contract awarded to the Hawaiian Dredging Company for dredging the slip between Piers 6 and 7 and 7 and 8, and described in the last report, was completed during this period.

The contract awarded to the same company for dredging the slips between Piers 15 and 16 and 16 and 17 was incompleted, due to the fact that this contract also required certain lands to be filled which could not be performed until the dredge had cut its way into Kapalama Basin, which work is now well under way.

PIER 11.

The contract awarded last period to E. J. Lord for the construction of Pier 11 was completed this period at a total cost of $170,410.17.

This work was carried out with the utmost dispatch, and very satisfactorily performed, and is an excellent addition to Honolulu Harbour, and together with Pier 10 makes a berth 1,000 ft. long, capable of berthing the largest steamers that can enter the port.

PIER 11 SHED.

Plans and specifications were prepared, tenders called for, and a contract awarded to Walker and Olund, for the sum of $540,524.00 for the construction of the superstructure on Pier 11.

This structure will be constructed with a structural steel frame, reinforced concrete, walls and floors, with a tar and gravel roof. There will be a passenger gallery along the harbour side 32 ft. wide, from which the passengers will descend by a ramp to the street, and thus eliminate stairs for the main handling of passengers. Above the centre of the main gallery will be an open room for the band that plays on the arrival and departure of steamers. The walls of the structure will be plastered with stucco, and the roof showing on the harbour side will have green tile, giving the whole shed a very pleasing appearance. Along the Queen Street front of the shed will be constructed a two-storey reinforced concrete store and office building, which will add much to the appearance of the structure and will also bring in a very substantial revenue to the Territory, and, in fact, arrangements have already been made with prospective tenants to occupy this end of the wharf shed.

It is now planned to dock the Matson Navigation Company's new steamship *Malolo* now under construction. At this pier special care has been taken to lay out the necessary facilities for the proper, safe and economical handling of passengers and freight that this large vessel will carry.

The removal of the old Allen and Robinson buildings, as described in the previous report, to make way for the construction of the Pier 11 project, was completed during this period.

ACQUISITION OF PROPERTY ON QUEEN STREET.

The property on the corner of Queen and Fort Streets, owned by the Campbell Estate, was acquired for the sum of $69,318.00. The next adjacent property, owned by the Robinson Estate, was acquired for the sum of $54,692.63. Both of these pieces of property was acquired by friendly condemnation suits.

The next piece of property adjacent to the Robinson property and owned by the Inter-Island Steam Navigation Company, was acquired by private sale for the sum of $90,131.25, it being agreed that the Inter-Island Steam Navigation could maintain their offices there until December, 1927, and that suitable quarters would be provided by the Board of Harbour Commissioners for the clerks of the Inter-Island Steam Navigation Company, who at present occupy a rear annexe that will have to be torn down immediately to make room for the construction of the Pier 11 shed.

With the acquisition of these three properties, the Territory now owns all of the land and buildings on the makai side of Queen Street between Fort and Nuuanu Streets.

With the completion of the Pier 11 shed all of the old buildings now occupying this area will be torn down and the Queen Street widened nearly 100 ft. A parking strip will be provided in front of the office building section on Queen Street, which will add greatly to the appearance of the entire surroundings.

REMOVAL OF OLD CUSTOM HOUSE.

The old Custom House buildings and site, located at the corner of Fort and Allen Streets, were turned over to the Territory by the Federal Government, so that the same could be cleared and the whole area opened up, the present street widened and a park constructed in the centre, all in connection with the construction of Piers, 8, 9, 10 and 11.

In order to obtain this site the Territory had to provide offices for the Custom House inspectors, and also a Custom House bonded warehouse. The inspectors were located on Pier 7, and the bonded warehouse provided in the next adjacent block in a Territorial owned building, which was renovated for the purpose. The 1925 Legislature provided $20,000.00 for this work, and the old Custom House buildings were sold at public auction for the sum of $3,015.00.

KAPALAMA BASIN.

The title to that part of Kapalama Basin, having been acquired by the Territory from the Bishop Estate for the sum of $15,000.00 including a fishing right, the Board of Harbour Commissioners prepared plans and specifications for the first unit of the dredging, which included the removal of 132,000 cubic yards of material from the end of the pineapple channel to the proposed new wharf site. This contract was let to the Hawaiian Dredging Company for the sum of $56,760.00.

Private interests have dredged a channel 100 ft. wide and 20 ft. deep along the mauka side of Kalihi Channel running from Honolulu Harbour to Kapalama Basin.

Plans and specifications are now being prepared for the construction of the first unit of the wharf system, which will be known as the "pineapple wharf," as it is the intention to unload all fresh pineapples at this wharf, shipped to Honolulu from the outside islands. The wharf will be of reinforced concrete throughout, with four lines of tracks on same, and also an extra rail so that a locomotive crane can be used to unload the pineapples from the scows.

In order properly to carry out this project, negotiations have been entered into with the Oahu Railway and Land Company for the acquisition of all the water frontage on Kalihi Channel and Kapalama Basin, also friendly condemnation suit has been entered against the John Ena Estate for their holdings fronting on the new wharf site. This acquisition of land will cost $900,000.00, and, of course, is contingent on an appropriation by the 1927 Legislature.

A condemnation suit was entered against the fish pond on the Ewa side of the basin, but will be withdrawn at an early date as the acquisition of the land above referred to will give the Territory all the water frontage required to carry out this development.

The Board of Harbour Commissioners has recommended to the U.S. Engineers Department that it would be more desirable to dredge Kalihi Channel 300 ft. wide at this time instead of the full width of 800 ft., which then, with the 100 ft. channel already dredged, would provide a channel 400 ft. wide and one which could be easily widened as increased shipping demanded it.

With the completion of Kalihi Channel as outlined by the Federal Government, and the construction of wharves as contemplated by the Territory in the Basin, the facilities of Honolulu Harbour will be increased sufficiently to take care of present and future shipping calling at Honolulu for many years to come, and, in addition, will be a well-protected land-locked harbour.

MAINTENANCE AND REPAIRS.

During this period the usual repair work has been carried out on the various piers in Honolulu Harbour as they became necessary, said repairs consisting principally of replacing wooden piles with concrete, repairing fenders, deck timber and planking, and repainting where necessary, repairing leaky roofs and repairing and painting oil pipe lines.

The amount spent on each pier is as follows:—

Pier 6	$21,268.04
Pier 7	6,820.02
Piers 8, 9 and 10	2,552.79
Pier 12	437.87
Pier 13	254.00
Pier 14	632.26
Pier 15	2,629.54
Pier 16	1,197.65

OFFICES FOR CUSTOM INSPECTORS.

When the old Custom House buildings were removed at the foot of Fort Street, new quarters were provided by the Board of Harbour Commissioners for the Custom Inspectors in the old offices vacated by the Harbour Master on the second floor of Pier 7. These offices were thoroughly renovated at the expense of the Territory before the Custom Inspectors moved in.

ISLAND OF MAUI MALA WHARF.

During this period the shed on this wharf was extended on the sea end 25 ft., and the offices and waiting room moved from the land end to the new extension on the sea end, which makes it much more convenient for the handling of passengers. The ordinary repairs were also performed.

DREDGING KAHULUI.

Plans and specifications were prepared and a contract awarded to the Hawaiian Dredging Company for dredging 115,000 cubic yards on the shore end of the area between the new and the old wharves, for the sum of $115,000.00. When completed, this will complete all of the necessary dredging to be performed by the Territory for the construction of the new Claudine Wharf.

PAINTING WHARF SHED, KAHULUI.

Plans and specifications were prepared and tenders called for, and a contract awarded to the Kahului Railroad Company for painting the entire shed on the new Kahului Wharf for the sum of $3,000.00, which has been satisfactorily completed.

BORINGS PIER 2, KAHULUI HARBOUR.

Plans and specifications were prepared and a contract awarded to A. H. Hobart for making borings for the new Pier 2, Kahului, known as the Claudine Wharf, for the sum of $2,593.00. This work was in connection with the design for the new wharf, and has been satisfacorily completed.

NEW PIER 2, KAHULUI.

Plans and specifications are now being prepared for the construction of a new reinforced concrete pier at Kahului on the site of the old Claudine Wharf, and will be known as Pier 2. This work is now approximately 60 per cent. completed, and it is hoped will be under construction by the end of the year.

SURVEY AND SOUNDINGS, HANA HARBOUR.

Plans and specifications were prepared and a contract awarded to A. H. Hobart for making a survey, soundings and sweeping the harbour at Hana to locate any pinnacles that protruded above the bottom endangering shipping.

Where pinnacles were found, they were blown out. A range was set up to assist vessels entering the harbour, and there is now a clear channel with not less than 30 ft. of water, 300 ft. wide. A few borings were also taken for a future wharf extension.

MAINTENANCE AND REPAIR.

The usual maintenance and repair work has been carried on during this period on the various wharves and landings on Maui, Molokai, and Lanai, and the following amounts, including wharfingers' salaries, were expended:—

Mala	$3,619.25
Claudine	1,876.35
Hana	996.21
Kahului	4,099.71
Pukoo	132.00
Kamalo	560.13

ISLAND OF MOLOKAI PUKOO.

The business being very small and due to the very poor condition of this wharf, the Board of Harbour Commissioners decided to officially abandon same and dismantle it, which will be completed now in a very short time.

Kamalo being only a short distance away, and being a wharf upon which the trucks can drive directly, and being in good condition, it did not seem advisable to make extensive repairs to this wharf.

KAMALO.

Plans and specifications were prepared and a contract awarded to Daniel N. Pahupu for the sum of $9,475.66 for making a rock-filled approach to this wharf, leaving two waterways through same and constructing a gravel road on the rock fill, thereby doing away with the railroad tracks.

With this new approach, the trucks can drive on to the wharf and load the scows direct, which is much more convenient and saves the labour of rehandling and pushing the cars down, as was previously done.

A few minor repairs were also made to the wharf proper.

KAUNAKAKAI.

This project was fully described in the last report, and a law-suit having been entered as to the award of the contract and the case still being in court, no progress has been made.

The old wharf is in a very dilapidated condition, and the Board of Harbour Commissioners are very anxious to start construction on the new wharf, but cannot until the courts have finally given their decision in the case.

ISLAND OF HAWAII: RECONSTRUCTION OF PIER 1 AT HILO.

The contract awarded to R. E. Woolley for reconstructing the old wooden pile supported portion of Pier 1 in concrete was completed during this period.

The front of the shed, which was previously all open, was walled in and provided with 18 roller shutter doors. This work was also completed. This walling in of the front was a much needed improvement, and greatly increases the storage capacity of this wharf, and also thoroughly protects the sugar storage space from severe weather. The entire wharf is now in first class shape.

SOUNDINGS AND BORINGS.

Plans and specifications were prepared, and tenders called for, and a contract awarded to A. H. Hobart for sounding and making borings in connection with the construction of Pier 8, Hilo for the sum of $4,440.00. This work has been satisfactorily completed.

NEW ENGINE, HILO PILOT BOAT.

Plans and specifications were prepared and bids called for, for a new Buffalo Marine Engine for the Hilo pilot boat. Grace Brothers and Company were awarded the contract for the sum of $731.00.

PIER 3, HILO.

Plans and specifications were prepared and tenders called for, for Pier 3, Hilo, and a contract awarded to the Hawaiian Dredging Company for the sum of $425,585.00. This contract provides for the construction of a reinforced concrete wharf, joined to and made a part of Pier 2, and gives a berthing space of 175 ft. on the harbour end and 600 ft. berth in the slip.

The contract also provides for the dredging of a slip amounting to 87,000 cubic yards, the dredged material to be pumped back of a rip rap wall. When filled, this area adjacent to the wharf will be a very valuable parking space for automobiles, excellent for storing material, and well adapted to railroad tracks, two of which will be brought on the wharf and connected up to the Hawaii Consolidated Railway Company back of Pier 2. In order to make a better approach, the molasses tank now on the shore end of Pier 2 will be removed.

HOOKENA LANDING.

Plans and specifications were prepared and tenders called for and a contract awarded last period and finished this period to Jas. D. Lewis for the construction of an approach and sea wall to the Hookena landing for the sum of $3,199.81.

ISLAND OF KAUAI: NAWILIWILI RETAINING WALL.

Plans and specifications were prepared and tenders called for and a contract awarded to Hobby and Coney, for the construction of the Nawiliwili retaining wall for the sum of $291,750.00.

This wall contains approximately 93,000 tons of rock. The inner walls are faced and capped with rock weighing 250 pounds, and the outer wall faced with stone weighing two tons. When finished, the area back of the wall will be filled by dredgings from the harbour made by the U.S. Engineer Corp, and the land used for the development of wharf and harbour facilities.

MAINTENANCE AND REPAIR.

The usual maintenance and repair work was carried on during this period on the various landings on Kauai, and the following amounts, including wharfingers' salaries, were expended:—

Hanalei	$91.94
Waimea	$388.44

TOLLS ON FREIGHT PASSING OVER TERRITORIAL GOVERNMENT WHARVES.

The collection of tolls on all freight passing over Territorial owned wharves has progressed very satisfactorily, and, with the excellent co-operation of the steamship companies, no difficulties have been encounterd, and they have been collected at no additional expense to the Territory.

The revenue during this last period amounted to the substantial sum of $132,583.90.

A New Oil Tanker.

Launch of the S.S. "Varand."

The single-screw tank steamer *Varand*, built to the order of the Baltic Trading Company by Sir W. G. Armstrong, Whitworth & Co., Ltd., was successfully launched from the Walker Shipyard on October 24th. The launching ceremony was gracefully performed by Miss Beryl Gertrude Weatherley.

DIMENSIONS.

The principal dimensions of the vessel are:—

Length overall	427 ft.
Length between perpendiculars ...	412 ft.
Breadth moulded	53 ft.
Depth moulded to upper deck ...	31 ft. 6 in.

The vessel is designed to carry 8,475 tons on a mean draft of 25 ft., and her speed on trial, when loaded to this draft will be 11 knots.

The vessel is of the two-deck type, with poop, bridge and forecastle, built to Lloyd's highest class, and framed on the longitudinal system.

ACCOMMODATION FOR CREW.

The captain and officers are accommodated in steel houses on the bridge and upper bridge decks, the engineers in the poop, and the seamen, firemen and petty officers in the forecastle.

Oil fuel is carried in a cross bunker at the forward end of the machinery space, and also in the fore deep tank. Feed water is carried in the double bottom under the machinery. The vessel is electrically lighted throughout, and is fitted with a ½ k.w. wireless installation.

A combined hand and steam windlass, capable of working the bower anchors and cables, is fitted on the forecastle head. Two steam winches are fitted on the upper deck, and a warping winch on the poop. A steam steering gear is fitted in a house at the after end of the engine casing on the poop deck, also a powerful hand gear on the rudder head.

The cargo oil pumps are three in number, two fitted in the after pump room and one in the forward pump room, together with a complete oil piping system. The vessel is also fitted with a ballast pump and oil fuel transfer pump, arranged in pump room in fore hold for dealing with the forward ballast and fuel.

PROPELLING MACHINERY.

The propelling machinery consists of a set of direct-acting surface condensing, triple expansion marine type engines, of the most modern and improved design, having cylinders 27 in., 45 in., 75 in., with a stroke of 48 in.

The boilers, three in number, are of the cylindrical multitubular type, 15 ft. 9 in. diameter by 11 ft. 9 in. long, working at a pressure of 180 lbs., and fitted with Howden's forced draught arrangements; also a donkey boiler 12 ft. diameter by 10 ft. 6 in., long, with a working pressure of 120 lbs. per square inch.

The North Eastern Marine Engineering Co., Wallsend-on-Tyne, is responsible for the propelling machinery.

Port of Havre Affairs.

NOUMEA DOCK.

A deep berth is now being dredged at the Quai Noumea.

NEW ENTRANCE SOUTH SEA WALL.

The pulling down and rebuilding of the Old Entrance South Sea Wall has now been under consideration for some time, and the Minister for Public Works has lately declared his willingness to have the work done under the Dawes plan. No further step has been taken pending the answer of the Minister for Finance.

The Contractors, Holzmann and Schneider, the former German and the latter French, have been considering during the last few months the possibility of undertaking the work together. Without a doubt the enlargement of the Entrance will greatly improve the Harbour.

NEW GRAVING DOCK TO BE PUT IN COMMISSION.

The cofferdam in front of the water gate has now been partly removed and some dredging done so as to enable the *s.s. Paris* of the French line to dry dock in Havre early in November, instead of going to Cherbourg as in former years.

Although the dock was put in commission on October 30th, the formal opening will not take place until next year, when the President of the French Republic pays an official visit to Havre.

BIG FLOATING DOCK FOR HAVRE.

It is rumoured that the Dock Board of Havre is contemplating the purchase of a floating dock large enough to accommodate the biggest liners. This would be berthed on the south side of the Mole Central, the north part being already used for three small docks. Engineers from the Port of Bordeaux are now testing the new floating dock just delivered by the German builders. A number of Port of Havre officials have been sent over to supervise the first sinking.

PASSENGER TRAFFIC.

Between September 15th and 22nd, more than 8,400 passengers were landed at Havre. In one case eight liners called within 48 hours. These numbers are a record and due to the visit of the American Legion. The White Star Line has announced that both the West and Eastbound liners of the London-Montreal-Quebec Service, will call at Havre as well as at Southampton, the first call being on March 24th, 1928.

DOCK AND HARBOUR DUES.

The figures for the periods extending from January 1st till September 20th for the years 1926 and 1927 were:—Dock dues—1927: 6,330,644 francs 53; 1926: 2,244,311 francs 79. Harbour dues—1927: 11,121,295 francs 52; 1926: 9,151,528 francs 24. The increase in the amount of dock dues paid is chiefly due to the tariff having been trebled.

Harbour dues show a total increase of 1,969,767 francs 28, shared by ship dues at the rate of 4 per cent.; Passenger dues, 103 per cent.; Cargo dues, 0.8 per cent.

RAILWAY PASSENGER STATION AT QUAI D'ESCALE.

This railway station is soon to be doubled in length so as to accommodate the passengers of two liners calling at the same time and thus cope with the increasing passenger traffic in Havre. The Quai d'Escale dock has been used for some time by the Cunard line and it is now announced that the White Star liners will call there next Spring.

NEW CRANES CONTEMPLATED.

An order for a complete set of bridge cranes for handling Colonial timber is likely to be placed with Caillard and Co., at a total price of 1,247,500 francs.

CRANE GANTRIES FOR QUAI DU BRÉSIL.

A contract has been signed with the firm de Gésincourt for the building of 5-ton electric crane gantries, their quotation being 317,000 francs.

FIVE-TON GANTRY CRANES FOR QUAI JOANNES CONVERT.

The three gantry cranes ordered last year from Caillard and C., of Havre, are now in course of erection, as well as the two others from Le Titan de France, the crane department of Messrs. Baudet, Donon and Co., of Argenteuil, near Paris.

PASSENGER GANTRIES.

More gantries are being erected to provide landing accommodation at the new liner berth of the Quai Joannes Convert.

WIDENING AND DEEPENING OF CHANNELS.

Widening and deepening of the Entrance and Bassin de Maree Channels is likely to be undertaken shortly. The outer channel would be widened southwards a distance of 50 metres and dredged to a depth of 10 metres below low water.

Port of Southampton Topics.

FLOATING DOCK EXPENSE.

The upkeep of the 60,000 ton floating dock, the largest structure of its kind in the world, is proving a far more expensive business than was anticipated. So great, indeed, has been the expense involved in its maintenance since it was brought to Southampton that the owners, the Southern Railway Company, are becoming apprehensive as to its future. Towards the end of September it was moved from its berth adjacent to the Town Quay for the second time in fifteen months owing to the silting up in the bed into which the dock sinks, and for seven weeks dredgers were engaged on the site restoring the depth to 75 ft. l.w.o.s.t. Preparation for the removal of the dock was in progress for a week and a 150-ton floating crane removed two of the 110 ft. latticed steel mooring booms and the high level gangway, and laid them on the bottom of the dock itself. The towing of the giant structure to its temporary berth was carried out by eight powerful tugs. At a not very distant date the bottom of the huge structure will have to be examined and scraped, and the question is being asked as to what will then happen. The dock is of the self-docking type, and each of the seven sections in which it is built may be removed and docked on the remaining sections. This, however, would entail a big outlay, and it is suggested that it would be more advantageous to build a grid on the shores of Southampton Water and to float the dock on to it at high water. Another suggestion put forward which might be put into operation should the overhead costs of maintenance of the dock in its present form be prohibitive, is that the bottom portion and walls should be filled with concrete and the structure sunk in a convenient position in the harbour for use as a graving dock. In this case one end would have to be sealed up and a caisson furnished at the other end.

EXTENSION OF CANADIAN SERVICE.

At a recent meeting of the Harbour Board, gratification was expressed at the decision of the White Star Line to open a new service between London and Canada, with Southampton as a port of call. Since then, however, other additions to the fleet of vessels using the port have been decided on, for in view of the success of the services maintained from Southampton the Canadian Pacific Company have decided to add two vessels to the number of their Southampton callers. These steamers will be the *Metagama* (12,420 tons), and *Montrose* (16,400 tons), both of which have previously centred on Liverpool. It was only in 1922 that the Canadian Pacific Railway came to Southampton, and though its activities at Liverpool have continued without a break, recent developments make it apparent that Southampton has come to be regarded as the Company's principal passenger port. This year the Company have had five of their larger type of vessel on the Southampton service, and the increase in accommodation which has resulted has had the effect of enabling the Company to carry 6,408 more passengers eastward and westward this year than during the corresponding period last year. This increase, no doubt, encouraged the Company to still further improve the Southampton service.

DEVELOPMENTS ON THE AFRICAN ROUTE.

Yet another service has decided to extend its activities at Southampton. Two weeks ago it was announced that the German African Service (Deutscher Afrika-Dienst) are to put two new vessels of nearly 10,000 tons on the Southampton route. The two vessels under construction will be oil-burners, and the biggest and fastest vessels on the Southampton services. The vessels—one for the Woermann Line and the other for the German East Africa Line—are being built by Messrs. Blohm & Voss at Hamburg, and they will embody a number of interesting developments in structural detail. All auxiliary engines will be electrically driven, and in consequence noise will be reduced to a minimum. Accommodation will be provided for 220 passengers, and a sports deck will be an interesting feature of the new ships. The fleet of the German African Services consists of 34 vessels, a big proportion of which are engaged in cargo trade. The passenger service, however, has been splendidly built up of recent years, and this latest announcement indicates a determination to develop still further in this sphere of shipping operation.

THE NEW DESTROYERS.

Southampton is keenly interested in the announcement that the Admiralty are expected to invite tenders for the building of one cruiser, six destroyers and eight submarines. In the past the port had a share of destroyer work and some outstanding vessels of this class were constructed here. Messr. John I. Thornycroft and Co., of Woolston, have a long series of successes to their name, and just now the firm are pushing ahead with destroyers for the Chilean Navy.

DOCK SCHEME RECLAMATION.

The reclamation of land between the Royal Pier and the Train Ferry Jetty in connection with the big dock extension scheme is now complete. This land is to be handed over to the town of Southampton for use as a recreation ground when the scheme is completed, but for the present the local authorities have decided that the Railway Company shall have the use of the land for installing the plant necessary for making piles and other materials required in connection with the contracts to follow.

SIGNAL STATION CONTRACT.

A contract for the construction of a signal station and tide-gauge at Calshot Seaplane Station has been placed by the Southampton Harbour Board. The work will be carried out by Mr. A. E. Farr, of London, whose tender for the work was £1,500. This addition to the harbour facilities has been urged for years by those connected with ships and shipping in the port. The signal station will enable prompt information to be secured concerning vessels entering and leaving the port and will be particularly valuable during fogs.

PORT OFFICIAL RETIRES.

After fifty-two years' service with the Company, Mr. T. C. R. Orme, O.B.E., has retired from the position of Assistant Marine Manager of the Southern Railway at Southampton, and his departure from Dockland is genuinely regretted by all connected with dock and harbour activity. In the position from which he has retired he was almost solely responsible for the cross-Channel traffic of the railway company, and during his years of service he saw remarkable developments in that department of Southampton shipping. At a luncheon, when, as the chief guest, Mr. Orme was presented with a half-hunter gold watch, Major Szlumper, the Assistant General Manager of the Company, spoke highly of Mr. Orme's knowledge of his work and his loyalty. Mr. S. R. Newcombe succeeds Mr. Orme with the title of Divisional Marine Manager at Southampton.

Tenders Invited.

TUG FOR COLOMBIA.

His Majesty's Consul General at Bogota (Mr. E. St. J. D. J. Monson) reports that tenders are invited by the Colombian Ministry of Public Works for the supply and delivery of a tug required for the Customs Service at the port of Buenaventura.

The draught of the tug fully loaded is not to exceed 6 ft.

A period of three months as from the 8th September is assigned for the submission of tenders.

Local representation is desirable.

Firms in a position to offer a British vessel can obtain further particulars on application to the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1. (Reference A.X. 5343).

CHAIN DREDGE FOR SPAIN.

The Commercial Secretary at Madrid (Captain U. de B. Charles, C.B.E.) reports that a notice was published in the Madrid "Gazette" of October 8th inviting tenders, adjudication for which will take place on 9th November next, for the supply of a chain dredge for cleaning the Castilla Canal. Specifications and conditions of tender may be examined at the Ministry of Public Works (Waters Section) and in the offices of the "Castilla Canal and Canalization of the Manzanares," Calle Lealtad, No. 11. Tenders will be received in the Ministry of Public Works up to 1 p.m. on November 8th next, and tenderers must deposit a sum of 3,000 pesetas. The Commercial Secretary states that this is the second call for tenders, and is open to foreign firms.

A VICKERS PRESENTATION.

An interesting event took place on the eve of Sir Basil Zaharoff's departure for Paris after his recent visit to London, when the chairman of Vickers, Limited, on behalf of all the directors, presented him with a handsome Cup on the completion of fifty years' connection with the Company. The plinth on which the Cup rests bears the following inscription:—

Presented to
SIR BASIL ZAHAROFF, G.C.B., G.B.E.,
by
THE CHAIRMAN AND DIRECTORS OF VICKERS, LIMITED.
on the completion of 50 years' connection with the Company and as a mark of their great appreciation of the valuable work which he has done for them and of their sincere gratitude and high esteem.

RECORD OIL IMPORTATION, SWANSEA DOCKS.

Swansea Docks is the largest oil port in the United Kingdom, and it is interesting to note in this connection a record oil cargo. The s.s. *Athelking* arrived on the 21st September with 13,410 tons of crude oil from Abadan for the National Oil Refineries, Ltd. This is the largest single cargo of any description imported through Swansea Docks.

Argentine Grain Handling Scheme.

£800,000 Order for British Engineering Firm.

The Beunos Ayres Great Southern Railway Company has decided to proceed immediately with a big scheme for the improvement of the grain handling and storage facilities at Ingeniero White, Bahia Blanca, in the Argentine Republic. The work to be undertaken will cost a little over £1,000,000, and will include the erection of a huge reinforced concrete granary having a capacity of 80,000 tons of grain, of 3,000,000 bushels, an extensive unloading plant capable of dealing with twenty-four 45-ton railway trucks at once, and an elaborate system of mechanical belt conveyors by means of which it will be possible to load grain to ships at the rate of 6,000 tons per hour.

The whole contract, with the exception of certain railway work and foundations, will be carried out by Messrs. Henry Simon, Ltd., the Conveying Engineers, of Manchester, at a total cost of £800,000. Messrs. Simon have already been responsible for the equipment of large granaries in different parts of the world, amongst the most important of which are those at Manchester, Hull, Capetown, and Bahia Blanca.

A short time ago the Beunos Ayres Great Southern Railway Co. asked Messrs. Henry Simon, Ltd., to report on the grain handling facilities at Bahia Blanca, where considerable traffic congestion has been experienced in recent years owing to the rapid extension of the Southern Argentine grain harvests and to the peculiarly complicated system of traffic handling which has grown up at Bahia Blanca. This report, which was prepared by Messrs. Simons' chief engineer after a personal visit to the Argentine, has been accepted in its entirety by the Board of the Railway Co., who have decided to proceed immediately with the new works recommended.

The scheme embodies a large new central granary, extensive shipping galleries and improved facilities for handling in-coming grain, all of which is in sack and is brought to the port by railway. Means will be provided for handling all railway trucks as they arrive, at one central point, without sorting and without the use of temporary storage sheds or the necessity for re-handling. This will expedite the railway work and will release rolling stock much more quickly than at present; it will also obviate the great amount of shunting which is necessary under existing conditions. The improved storage accommodation and loading out facilities will also speed up the work of transferring the grain to ships and will expedite the handling of the harvest throughout.

The new granary to be built at Ingeniero White near Bahia Blanca, will be situated at a point convenient for linking up with the two existing granaries at that port, known as Nos. 1 and 2, and at a point convenient for future extension. Normally practically the whole of the unloading of railway trucks will be carried out at the new granary. For this purpose a large unloading shed will be built adjacent to the approach lines to the existing elevators. There will be 48 unloading hoppers inside this shed, each capable of holding one 45-ton truck load and into which the sacks will be emptied immediately the truck has been brought into position.

There will be six railway tracks and it will be possible to unload 24 trucks at one and the same time, while 24 others are being placed in position. By this means there will be no loss of time while loaded trucks are being brought in. The grain will be carried for these hoppers by means of belt conveyors and delivered to receiving elevators inside the working house of the new granary. Each of these elevators, which will have a capacity of 500 tons per hour, will feed a dormant hopper scale of 45 tons capacity, i.e., one truck load, from which the grain will be sent to any one of the 338 storage bins, to the 16 loading out belts, or to the cleaning plants. There will be two main cleaning plants each having a capacity of 500 tons and each comprising ten " big 5 " Carter grain cleaners; these will remove wild oats, large impurities and light dust. Delivery to the storage bins will be effected by means of six main distributing conveyor belts, each provided with two electrically driven throw-off carriages.

The main storage building of the new granary will comprise 108 circular bins each capable of accommodating 470 tons of grain and 88 interspace bins of 120 tons capacity. In the working house there will be 82 circular bins each of 170 tons capacity and 60 interspace bins of 100 tons, making a total capacity of 80,000 tons of wheat, or approximately 3,000,000 bushels.

An elaborate dust collecting and disposal system will be installed. The grain will be drawn off from the storage bins and delivered by gravity to a series of belt conveyors which will in turn deliver to twelve shipping elevators arranged in a separate house situated between the working house and the main storage building. Through the lower portion of this shipping house will be arranged sixteen belt conveyors each capable of handling 500 tons per hour, twelve being shipping belts, and four linking up belts for connecting the new granary with granaries Nos. 1 and 2. The sixteen lines of loading out conveyors will be continued in an overhead steel gallery connecting the new granary with granary No. 1 and fourteen lines will be continued through the upper floors of Elevator No. 1 and through Elevator No. 2. They will pass from one to the other by means of two overhead steel galleries. Certain of these conveyors will be arranged to load out to vessels lying at the four existing berths alongside Granaries Nos. 1 and 2. Beyond these granaries, the present so-called elevator mole will be extended by a light concrete jetty carrying a steel shipping gallery containing twelve conveyors belts and provided with 24 loading spouts. There will be accommodation alongside this jetty for four ships, two on either side, and will be possible to load to all four at the same time. Grain will be spouted direct from the throw-off carriages of the conveyors into the holds of the ships. The plant will have a total loading out capacity of 6,000 tons of grain per hour to ships and 2,000 tons per hour to the existing two granaries. When the new plant is in operation it will be possible to load eight ships at one time. It is a practice in the Argentine to finish off bulk cargoes with a small quantity of bag cargo, and to meet this condition arrangements will be provided at the end of the existing elevator mole for loading lighters with bag wheat. There will be four lighter berths and lighters will be loaded either direct from railway wagons alongside or the conveyor belts passing overhead will be " tapped." In the latter case the grain will be filled into sacks by means of twenty "Reform" net sacking weighers, and the sacks loaded into the barges by means of gravity shoots.

The whole plant will be electrically driven, involving the use of something like 150 separate motors totalling 10,500 h.p. Messrs. Simons' contract includes the Transformer Sub-Station electric lighting throughout, telephone, and a special system of signalling to facilitate the rapid working of the Granary. It is expected that the whole of the new equipment will be ready for dealing with the 1930 harvest.

A Faversham Launching.

New Steel Motor Canal Barge.

Messrs. James Pollock, Sons & Co., Ltd., of London and Faversham, launched, on the 12th inst., at their Faversham Shipyard, a steel motor canal tug and cargo barge.

This is one of two vessels designed by Messrs. Pollocks for the same owners, Messrs. The Associated Portland Cement Manufacturers, Ltd., for their river and canal trade.

The design of the vessel is up-to-date in every respect for the special trade for which it is to be used, and includes an elliptic stern, raised quarter and raised forecastle. For propelling purposes a 90-b.h.p. two-cylinder Bolinder engine of the latest type will be installed.

The carrying capacity is 56 tons, and it is also intended to tow two barges carrying an aggregate of 120 tons.

The Junior Institution of Engineers.

Lecture on the Principles of Lubrication.

At the opening meeting of the session of the Junior Institution of Engineers, London, held on Friday, October 8th, Prof. Edwin Edser gave a lecture on the subject of " Lubrication." Prof. Edser confined his remarks in the main to the scientific principles of lubrication, and conducted one or two simple experiments to illustrate his points. He emphasised that lubrication did not depend only on viscosity: it was necessary for the lubricant to be attracted by the material to be lubricated to such an extent that it was carried into narrow spaces to form a separating film.

He illustrated the way in which a shaft will wear its bearing to an elliptical shape in order that the lubricant can be forced into wedge-shape spaces, thus causing the requisite pressure to be generated for maintaining the lubricating film. It would follow that the sooner that a bearing reached this condition, the better it would be. It had been found that, in running a machine, the desired condition of affairs could be reached much more quickly by using a vegetable oil, which had a slightly corrosive action.

A discussion followed Prof. Edser's lecture, in the course of which attention was directed largely to the Mitchell bearing and also various forms of footstep bearings. Mr. C. F. Adams described some occurrences with locomotive journals, which are peculiar in the respect that they have to work equally well in each direction and yet may not get equal wear in each direction. Other questions raised during the discussion concerned the mixing of oils and the precipitation of oxidation products. Mr. E. E. Thornley supplied some information on this point. Mr. J. Calderwood also described some experiments carried out by himself in relation to this subject.

Round Island Wireless Beacon Station.

A Notable Installation in the Scilly Islands.

New installations for the assistance of navigation, known as wireless beacons, are now under construction by Trinity House at various points around the English Coast. The purpose of these beacons is to send out distinctive wireless signals at regular intervals, enabling vessels fitted with wireless direction finders to take bearings on the beacon stations and accurately to determine their position. These installations form a valuable addition to the aids to navigation for ensuring the safety of life at sea and are expected to prove of the greatest assistance to marine navigation when ships are approaching land, particularly during darkness and in foggy weather.

View of the Beacon at Round Island, in the Scillies.

The first wireless beacon station to be put into regular commission by Trinity House is situated at Round Island in the Scilly Islands. This set has a power of 500 watts and is operated on a wavelength of 1,000 metres, which is the specified wavelength for wireless beacon stations. Each beacon station is to have a special call sign, and that at Round Island is the letters GGG in morse code.

The beacon transmitter has been designed by the Marconi Company to the specifications of Trinity House and the whole equipment is automatically controlled by a master clock for transmitting groups of I. C. W. signals at predetermined intervals.

Every possible precaution has been taken to ensure that risk of breakdown inherent in automatic operation shall be reduced to a minimum, and all running machinery is duplicated throughout, whilst a spare set of wireless valves is fitted on the main transmitter, with automatic switching arrangements, so that should a valve burn out, another immediately comes into use, and a suitable warning signal notifies the attendant. The master clock and character machine are also supplied in duplicate so that any possibility of failure of the apparatus has been obviated as far as practicable.

AERIAL AND EARTH SYSTEM.

A wireless mast consisting of a steel lattice tower, 60 ft. high, has been erected on the Island, and the aerial, which is of the multi-wire inverted "L" variety, is supported between this steel tower and the lighthouse gallery—the aerial having an average height of about 50 ft.

THE TRANSMITTER UNIT.

The whole of the transmitting circuits are mounted on a panel of robust construction and there is easy access to all parts.

Suitable chokes, condensers, resistances, voltmeters and ammeters are provided, and there are four valves, type T.250, two of which are actually in use, the other two being "stand-by" valves.

Should either of the two valves in use burn out, a relay mounted on the panel automatically brings the "stand-by" pair into operation, and at the same time a loud speaker alarm circuit is completed, for warning the attendant that one of the valves has become defective.

The filaments of the valves are heated by means of a step-down transformer from the main motor alternator.

The circuit used in the transmitter is that commonly known as the "back to back," and, consequently, the note actually heard in the receiver corresponds to a frequency twice that of the alternating current frequency.

The transmitting unit is itself enclosed by an expanded metal case, rubber matting being provided to avoid risk of shock.

THE HIGH FREQUENCY APPARATUS.

The high frequency apparatus provides for coupled-circuit working, and consists of two cabinets, one of which contains the aerial tuning inductance, variometer, coupling coil and aerial ammeter, whilst the other contains the closed-circuit inductance, reaction coil, closed-circuit condenser and closed-circuit ammeter.

The high frequency apparatus is designed to work most efficiently on the wireless beacon wavelength of 1,000 metres.

THE SIGNALLING APPARATUS.

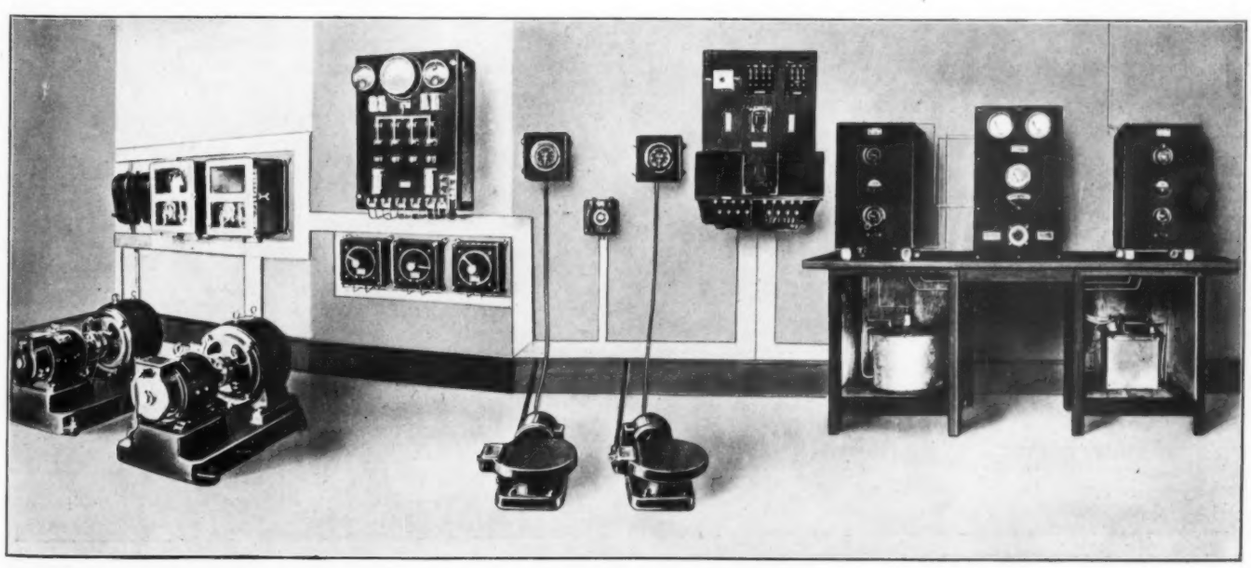
The signalling apparatus consists of two main parts: (1) The master control clock which determines the periods when the beacon is to come into operation; and (2) the character wheel which actually transmits the call sign of the station.

The duplicate master clocks are mounted on a switchboard which also incorporates a relay operated by the clock for starting up the motor driving the character wheel.

The signal for "Fair" weather periods consists of the call sign GGG repeated at the rate of 15 words per minute for 47 seconds, followed by a prolonged dash of 10 seconds duration and terminated by one repetition of the call sign, the whole transmission taking 60 seconds exactly. This transmission, followed by a silent period of three minutes in each case, is repeated three times, covering a total of 9 minutes every half hour.

This sequence is carried out by the clock in the following manner:—

Just prior to the beginning of the transmission, contacts on the clock start up the main alternator which provides the whole of the power required for the transmitter. A second pair of contacts then energises the motor of the character wheel, and the actual periods of transmission are governed by mechanisms incorporated in the character wheel. At the end of the third transmission the clock contact opens and the current to the main alternator is switched off until the next half hour period



General View of the Instruments and Switchboard.

is required. In fair weather the cycle is repeated every half hour.

In foggy weather a hand-operated switch is turned to short-circuit the alternator contacts, and the whole signal consisting of the one-minute transmission and three minutes silence is then repeated continuously.

SWITCHBOARDS.

In addition to the clock switchboard mentioned above, switchboards are provided for the main power plant. These switchboards mount all the necessary instruments, switches, etc., for controlling the respective running machinery.

MOTOR ALTERNATORS.

The motor alternators supplied with this station consist of a shunt-wound 1½ k.w. D.C. motor, designed to run off a 50-volt. supply, and coupled to a separately excited alternator 100/150 volts. 400/600 cycles single phase, both mounted on a cast iron bedplate. Suitable field regulators and automatic starters are also provided, and the frequency of the alternating current can be varied within the limits of 400 and 600 cycles.

BATTERIES.

The battery supplied, of the glass cell permanent type, is of ample capacity to run the complete station for a period of 12 hours without re-charging.

BATTERY CHARGING PLANT.

A special automatic battery-charging plant is installed which automatically starts up the engine and proceeds with the charging of the battery, directly the battery discharges itself below a predetermined level. Immediately the voltage of the battery has reached the required level, the engine is automatically switched off.

The illustration shows, from left to right, the main switch with two automatic starters underneath, which are the motor alternators: the three field regulators above which is the main switchboard. To the right of the main switchboard are the two speedometers or revolution indicators for the character wheel motors. The character motor field regulator is mounted just below and between these indicators.

On the floor immediately under this are the duplicate character motors with their character wheels which form the automatic signalling key for the transmitter. To the right of the indicators is the character switchboard, which carries two master control clocks which automatically start and stop the transmitter at specified intervals.

The table on the extreme right carries the wireless apparatus, the three instruments on the table being, from left to right, the closed circuit inductance, the oscillation generator containing four valves (two of which are spare), and the aerial inductance. In the left-hand cupboard is the closed circuit condenser, and in the right hand the power transformer.

Lloyd's Register Shipbuilding Returns.

GREAT BRITAIN AND IRELAND.

Lloyd's Register Shipbuilding Returns for the quarter ended 30th September show that the tonnage under construction in Great Britain and Ireland—1,536,416 tons—was 146,028 tons more than at the end of June, 1927, and 761,619 tons more than the tonnage building twelve months ago. The tonnage on which work was suspended at the end of September, 1927, amounts only to 8,488 tons as compared with 107,498 tons at the end of September, 1926.

The present totals, although the highest since September, 1922, are still 354,000 tons below the average tonnage building during the twelve months immediately preceding the war, i.e., 1,890,000 tons.

The tonnage under survey of Lloyd's Register amounts to 1,403,295 tons; this represents 91.33 per cent. of the total tonnage under construction.

A considerable decrease is shown in the tonnage commenced during the quarter, namely:—370,073 tons, as compared with 437,112 tons during the second quarter of 1927. The tonnage launched during the present quarter—355,542 tons—shows the large increase of 86,997 tons as compared with the figures for the previous three months.

OTHER COUNTRIES.

Merchant tonnage building in other countries—1,537,641 tons—is about 87,000 tons more than at the end of June, 1927. World tonnage building totals 3,074,057 tons.

The total figures include 113 steamers and motorships, each of over 1,000 tons, with a total tonnage of 775,632 tons, under construction in the world for the carriage of oil in bulk. Of these tankers, 62 of 404,592 tons are under construction in Great Britain and Ireland, and ten of 82,370 tons in France.

MOTOR SHIPS INCREASING.

The tonnage of vessels now building in the world which are to be fitted with internal combustion engines amounts to 1,589,510 tons, while the tonnage of steam vessels under construction is 1,468,842 tons. The motor tonnage thus exceeds by 120,668 tons the steam tonnage, showing the continued development which is taking place in the adoption of this system of propulsion.

In Great Britain and Ireland the motor tonnage under construction amounts to 653,342 tons, equal to 74.1 per cent. of the steam tonnage under construction.

In Danzig, Denmark, France, Holland, Italy and Sweden the motor tonnage under construction greatly exceeds the steam tonnage, the combined totals for these countries being 581,544 tons of motor ships and 137,964 tons of steamers.

The world figures include 89 motor ships, each of between 6,000 and 10,000 tons; 19 of between 10,000 and 15,000 tons; 10 of between 15,000 and 20,000 tons; and 4 of over 20,000 tons.

The Tug "Lord Glanely" newly installed at Cardiff Docks by the Great Western Railway Company. Length 80-ft., breadth 28-ft., depth 12-ft. 6-in., maximum draft 12-ft. It is of 800-h.p., equal to that of any two other operating tugs in Cardiff Docks (excepting the Steam Tug "Earl," owned by the same Company).

South Australian Harbours Board.

Revenues Increase. Final Meeting of Marine Board.

The operations of the South Australian Harbours Board, which took over from the Marine Board of South Australia on December 1st, 1926, show for the financial year ended June 30th, 1926, a further advance, the gross revenue amounting to £636,903 10s. 9d. an increase of £20,514 9s. 11d., while the expenditure from Vote (Revenue) was £161,817 1s., a reduction of £3,378 19s. 2d. on the previous year's total. The net balance transferred from Revenue Account to Profit and Loss Account was £475,086 9s. 9d., an improvement for the year of £23,893 9s. 1d. Interest on Loan Funds, unsettled claims for wharf properties and on Reimbursement Account absorbed £315,726 13s. 3d., while £30,000 is allotted for depreciation, leaving a credit to Profit and Loss Account at June 30th, 1926, of £222,220 6s. 10d., or a net increase during the year of £129,359 6s. 6d. The total liabilities for construction work and compensation for resumed properties now amount to £6,622,824 6s. 1d. Of this sum £356,595 3s. 10d. from Loan and £572 8s. 7d. from Vote (Revenue) was expended during the year and the total of compensation paid to private owners £82,584 5s. 9d.

In accordance with an arrangement made with the Railways Commissioner, the whole of the Board's shore sidings at Port Adelaide and certain outports were transferred to the Railways Department and the Board's capital debt, as a result, was reduced to the extent of £58,522 5s. vide Schedule D.

DEPRECIATION.

The depreciation provision now totals £212,917 19s. 7d. Of this amount only £57,917 19s. 7d. is in the hands of the Public Debt Commissioners, a third instalment of £20,000 having been allowed in this year's Expenditure Vote, while accrued interest totals £2,242 19s. 7d. The remainder, £155,000 is in a Depreciation Suspense Account. The Board again urges the necessity of making this depreciation effective and not merely a book entry.

MAINTENANCE.

The maintenance costs for the year amounted to £58,012 7s. 3d., or £10,600 13s. 6d. less than the previous year.

The provision barely suffices to keep the Board's properties in working order, but is inadequate to meet the renewals that should be effected to maintain them efficiently and with true economy.

ACQUISITION CLAIMS.

Failing to satisfy the Board of the justice of its claim of £152,569 for its properties at Port Adelaide, the Canal Company elected to have the matter referred to arbitration and was awarded the sum of £73,049. Unfortunately, the business arising from this property does not give a return equal to the interest on the amount of the award. The total compensation settlements for the year were £82,584 5s. 9d. Other owners have also decided upon arbitration, but owing to the pressure of work in the Courts no judge had been available to preside over the Tribunal called for under the Harbours Act.

MARINE BOARD.

By the Marine Board and Navigation Act Amendment Act, 1924, which received the Royal Assent, and was produced on December 31st, 1925, all remaining powers, jurisdiction, functions and duties vested in or imposed upon the Marine Board of South Australia, together with all rights, interests, liabilities and obligations, were transferred to the South Australian Harbours Board.

The final meeting of the Marine Board was held in the Board Room, Victoria Square, on December 22nd, 1925, when the President, in bidding the members a farewell, expressed admiration for their many years of faithful and valuable service to the State in their capacity as wardens. By direction, the following letter was transmitted to the retiring wardens at the instance of the Minister of Marine, the Hon. A. A. Kirkpatrick :—

> "Notification of the Royal Assent to the amending legislation passed last Session under which the remaining duties of the Marine Board of South Australia are transferred to the South Australian Harbours Board, has now been received, and a proclamation will issue bringing the amending Act into force on 1/1/1926, and from such date the Marine Board of South Australia will cease to exist.
>
> I am instructed by the Hon. the Minister to convey to you the appreciation and sincere thanks of the Government for the able services you have rendered to this Board for many years past.
>
> The Minister desires me further to say that he is assured that the knowledge and experience which you have brought to bear on the various matters engaging your attention as a warden of the Board would be made available to the members of the South Australian Harbours Board, and by whom any assistance you may feel disposed to render would be appreciated."

RETIREMENT OF OFFICERS.

Mr. John Darby, who for 33 years occupied the position of Secretary to the Marine Board, reached the retiring age in May, 1924, but the Government, at the expressed request of the Board, agreed that Mr. Darby's services should be retained until such time as the Royal Assent was proclaimed and the Marine Board ceased to exist. Mr. Darby, therefore, retired on December 31st, 1925, carrying with him the very best wishes of not only his fellow officers in the Harbours Board and Marine Board, but of the whole of the shipping community with whom he had been brought into intimate touch over so long a period of years. Mr. Darby had a thorough knowledge of all matters pertaining to shipping, was a very valuable servant to the State, and his work was well appreciated by all who came into contact with him.

Captain P. Weir retired from the Service on June 30th, 1925, having reached the age of 70 years on January 5th, 1925. He joined the State Service in 1899. Some 11 years of Captain Weir's official life were spent as master of s.s. *Governor Musgrave*, and on the retirement of Captain Alex. Inglis on June 30th, 1915, Captain Weir was appointed to the position of Harbourmaster, Port Adelaide. Captain Weir's intimate knowledge of the South Australian coastline and conditions, as well as his scientific attainments, made him a very valuable officer.

UNIFORM TIDE AND DREDGER SIGNALS.

A uniform system of tide and dredger signals brought forward by the Hobart Conference of Australian Harbour Authorities in 1922 was finalised and brought into operation on July 1st, 1925, in all the States but Queensland, that State having since followed.

Day signals only have been in use at the Semaphore Signal Station for some years, but the service is now continuous, an electric installation having been instituted from the 1st November, 1925.

COOBOWIE.

The new causeway and short pier were completed and opened by the Chairman on the 14th August, 1925.

MARION BAY.

The Victor Electric Plaster Company, having acquired the interests of Mr. A. H. Hasell in the jetty at Marion Bay and his extensive gypsum leases a few miles inland from the bay, entered into negotiations with the Board under which an extension of the jetty is being made so as to enable small interstate steamers to load gypsum in bulk. It is the company's intention to draw gypsum supplies from the Marion Bay deposits for its main works in Victoria, so that the exports over this jetty are likely to be largely increased.

PORT PIRIE.

The Broken Hill Associated Smelters' Wharf is in course of extension, and the recently constructed gantry tracks will be extended so as to enable the travelling cranes for the handling of bullion, coal, coke and ore, to be operated from one end of the wharf to the other.

It may be noted that the deepest draught vessels piloted out of Port Pirie since the opening of the 18 ft. channel have been the *Indianic*, 25 ft. 3 in., on the 12th November, 1915, and the *War Penguin*, 25 ft. 3 in., on the 26th August, 1919, the latter vessel negotiating the channel at night time.

LIFE-SAVING APPLIANCES.

Several lifeboats and rocket stations along the coast, as well as stores at West Bay and Cape de Couedie, on Kangaroo Island, for the relief of shipwrecked mariners, have been maintained in a state of efficiency and preparedness. Unfortunately, there still exists a small section of the public which continues to interfere with and steal from these stations. Drag poles and lifebuoys continue to be lost, and the stores at West Bay have been pillaged. No trace of the delinquents can be found.

REGULATIONS.

During the year regulations in regard to the following matters were made by the Governor-in-Council on the Board's recommendation :—

Wharfage on malt, Port Adelaide.
Overtime rates for outport harbourmasters, assistants and jetty attendants.
Wharfage and haulage on peas.
Rates of hire of steam cranes at Port Adelaide and Outer Harbour.
Boat service, Ports Lincoln, Thevenard, and Wallaroo.
Wharfage on salt, Port Adelaide.
Wharfage on returned motor body cases and furniture vans.
Compulsory pilotage, Port Lincoln.

AVERAGE RATES OF WHARFAGE.

The following scale shows the average wharfage rates paid per ton on cargo passing over the Port Adelaide wharves in recent years:—

	Cargo (tons.)	Wharfage Collected. £ s. d.	Average rate per ton. s. d.
1918-19	... 1,538,699	120.562 7 11	1 6.81
1924-25	... 2,478,741	271,831 10 4	2 2.32
1925-26	... 2,388,778	282,306 9 3	2 4.36

Wharfage rates were raised by 20 per cent. on October 16th, 1919, followed by a further 20 per cent. increase, making 40 per cent. in all, on August 25th, 1920.

PORT LINCOLN.

The new railway goods sheds at Port Lincoln have been finished, and arrangements entered into by the Board with the Adelaide Steamship Company and the Railways Department came into operation, and the obsolete town jetty was put out of commission, all cargo now being handled at the new pier and Kirton Point Jetty. The latter jetty was constructed some years before the inception of the Board, but owing to the unsatisfactory form of the jetty, it can no longer cater properly for modern oversea tonnage, and can only be considered a standby until such time as money is available for the extension of the New Pier. Owing to the general financial stringency at the time the latter was constructed, the Board was required to build a shorter pier than it deemed necessary.

RECLAMATION AREAS.

Attention is drawn to the Board's reclaimed areas on the Birkenhead side of the harbour at Port Adelaide which are eminently suitable for the establishment of large industries, to which nearness to navigable waters is a desideratum. The savings of transport expenses to any business dealing with bulk commodities will, no doubt, ultimately attract keen manufacturers who are alive to the advantages of water frontage. At the inception of this scheme the Board found difficulty in getting tenants, owing to the short-term leases, i.e., 21 years, allowed under the Harbours Act, 1913. On representations being made to the Hon. the Minister of Marine amending legislation was introduced, and Section 68 of the principal Act was amended so as to enable the Board, with the approval of the Minister, to grant leases of any land vested in the Board for such term and with such right of renewal, if any, and at such rental and upon such other terms and conditions as the Board, with the approval of the Minister, thinks fit. This gives an opportunity for manufacturers and others to provide for the amortization of heavy outlay on plant and buildings without undue burden.

It is significant that the port of New Orleans laboured under the same difficulties; and, the amending legislation above referred to being brought to their notice, it was decided to appeal to the State Legislature of Louisiana, U.S.A., for similar relief to that granted to this Board in order that the Port Commissioners might successfully proceed with the development of the land they were reclaiming on the canal leading from the River Mississippi into Lake Pontchartrain.

LEASING OF RECLAIMED AREAS FOR INDUSTRIAL PURPOSES.

Negotiations were concluded at the end of the previous year with General Motors (Aus.) Pty., Ltd., for an area of about six acres, the nearest point of which is within 150 yds. of an oversea wharf where the parts of some eight makes of motor cars are landed to be assembled in the extensive works erected by the company.

It seems an anomaly, however, that the bodies for these cars are built several miles away from the seaboard, necessitating the carriage of raw materials to the works and the bulk of the finished car bodies back to Birkenhead, Port Adelaide, for incorporation in the finished car or for shipment interstatewise.

The Commonwealth Oil Refineries, Ltd. have leased a similar area on the water frontage, and a new jetty is in course of construction for the landing of their oils.

Negotiations with a third company have been practically completed, but operations have not yet been commenced.

RESTRICTED OPERATIONS.

The Board has from its inception been hampered by a lack of funds to carry out port improvements which it is conceded are urgently necessary. Were this merely a money-spending and not a profit-earning concern, it could be understood that restrictions might be placed on its capital outlay, but when such outlay is required to enable an adequate service to be given in exchange for the ample dues and charges made, it is not difficult to understand why the Board is unable to satisfy its customers' requirements.

PILOTAGE.

The total number of vessels piloted at Port Adelaide was 1,233, being 613 in and 620 out, compared with 1,239 in 1924-25, 1,278 in 1923-24, 1,262 in 1922-23.

SIR GEORGE BUCHANAN'S VISIT.

At the instance of the Commonwealth Government Sir George Buchanan, K.C.I.E., Kt., who had been brought out from England by the Right Honourable Prime Minister, visited South Australia and made inspections of Ports Adelaide, Wallaroo, and Pirie, and was requested by the Hon. Premier to report on the alternatives of Victor Harbour and Goolwa as a site for a port for the Murray Mouth. Sir George Buchanan visited Victor Harbour, Goolwa, and Goolwa Beach, together with members of the Board, and made certain confidential communications to the Board for the Hon. Minister, to be dealt with in his written report to the Government.

PROPOSED BRIDGE FOR BIRKENHEAD.

Plans for a bridge to Birkenhead were referred by the Hon. Premier to the Board for consideration and report. It was found that these plans provided for a clearance of only 5 ft. above ordinary high water spring tides. In view of the great number of small craft that pass Commercial and Elder Road ends, and of the fact that the tides frequently exceed the ordinary spring rise of 8 ft. 6 in., also that the fire float required a much greater clearance, the Board recommended that a clearance of 12 ft. should be given; and suggested modifications which, while retaining the essentials of the bridge designed by the Chief Engineer for Railways, set out how the necessary clearance of 12 ft. could be given without much, if any, increase in cost. Further, it was pointed out that while the bascule bridge can be opened in very quick time, yet to give passage to all small craft that pass this point would necessitate either their being held up for long intervals or the bridge being opened quite as long as it would be closed. The matter is to receive further consideration.

WALLAROO.

Some time subsequent to the commencement of the conversion of gauges on the western railway system, the Railways Commissioner advised that the Mikado engines would be used as soon as the broad-gauge was laid and that Wallaroo Jetty would have to be put in readiness for broad-gauge traffic. After careful investigation it was agreed that it would be more costly to widen and strenthen the old pier to take the heavier traffic than to build a new one, and a site close to the old baths was decided upon. The plans for the new jetty were drawn by the Board and submitted, at the instance of the Hon. Premier, to Sir George Buchanan while visiting this State. Sir George endorsed the Board's plans for a timber jetty. When tenders were called the Railways Commissioner tendered at a lower figure than private contractors, and at the same time submitted an offer at a further reduced figure to build to a design prepared by his own officers. The Government did not accept the Board's recommendation for the acceptance of the tender of the Railways Commissioner, but directed the Railways Commissioner to proceed with the erection of a jetty as designed in his department. The Board protested that this jetty was of too light a type not only to withstand the heavier type of shipping using Wallaroo, but that the size of the bracings left no margin for the attacks of teredo and other marine pests. Ultimately the Board was, by direction of the Hon. Minister, exonerated from any responsibility for this departure from the usual standard, and the erection of the jetty was begun without any contract having been entered into between the Railways and the Board.

AUDIT REPORT.

Regarding the certificate of the Auditor-General appended to the accounts herewith, it is but fair to state that a *complete* schedule of assets is impossible until the remaining settlements are made for properties acquired by proclamation.

The Board has also been required to take debit for former Crown lands vested under the Harbours Act. Most of these were formerly vested in the Marine Board without charge, and not being fully defined, had to be surveyed.

The valuation of these areas has, since the close of the year, been adopted with the approval of the Hon. the Controlling Ministers. The ascertaining of costs of many of the older outport structures has been very difficult and protracted, but at the date of this submission is complete.

STAFF.

The Commissioners desire to express gratification at the loyal and efficient efforts of their staff. The Board seeks to inculcate amongst its officers a proper pride in their undertaking and a sense of duty as well as the need for co-operation with other departments of the State in giving effective service to the public.

WORKS.

Firefloat Berth.—A berth has been provided at Birkenhead for the Fire Brigade's new firefloat, which should prove a great safeguard to wharves and shipping.

Steam Cranes.—One 15-ton and two 10-ton steam rail travelling cranes for use on wharves have been delivered during the period. They have since been assembled, and are now in full working order.

Maintenance.—The maintenance of wharves, jetties, etc., at Port Adelaide and the various outports, which is a very big item, has been successfully carried out. Extensive repairs and

renewals were necessary, especially at Port Dock, Ocean Steamers' and McLaren Wharves, Port Adelaide; Wallaroo, Port Julia, Lipson Cove, and Grange Jetties and Morgan Wharf. Repairs to Carrickalinga Jetty, which are of a more extensive nature, are in hand.

Contracts in Hand. Bucket and Suction Dredgers.—Good progress had been made with the construction of these dredgers, one of which, i.e., the suction dredger, had been taken over by the Board. The bucket dredger is nearly completed and ready for trials.

Three Steel Hopper Barges.—Good progress had been made with the construction of these barges, which have a capacity of 670 cub. yds. each, one of which has already been completed.

No. 1 Dredger.—A contract was let for the supply of 12 buckets.

Nos. 5 and 8 Dredgers.—A contract for 20 bucket backs, for these dredgers, was accepted.

Coal-handling Electric Cranes, Osborne.—The erection of these cranes was in hand.

Outer Harbour—Widening Nos. 2 and 3 Sheds.—Good progress was being made in this work.

No. 2 Quay Concrete Wharf.—About one-third of the piles for this wharf, which is 1,050 ft. in length, had been driven, and 136 lineal feet of concrete wall completed.

Construction. Port Adelaide.—Birkenhead Wharf is being reconstructed and re-sheeted with steel joists, and floor of No. 2 shed has been raised. The metalling of stacking blocks at No. 2 quay is in hand, and roadway at east end almost completed.

Osborne.—Foundations for coal bins and conveyor completed and crane tracks laid. Fencing and levelling of reclaimed area was well in hand. A metal road was constructed for 20 chains approaching S.A. Gas Company's lease, and one of 20 chains length to coal bins was in hand.

Outer Harbour.—The ore bin floor has been extended, and the north revetment mound also extended for a further 400 ft.

Port Pirie.—A small jetty at south end of Baltic Wharf was constructed for fishermen during the period, and the Federal Dock cargo shed completed. Between beacons 8 and 9 in the Port Pirie River a new beacon (8A) has been erected. No. 2 light beacon was also converted to an A.G.A. flashing light.

South Bay.—A goods shed and Harbourmaster's office has been erected at this port.

Port Vincent.—The wharf at this port has been extended for 150 ft.

Streaky Bay.—The shore end of the jetty was widened and the sea wall extended for 60 ft.

Port Price.—The wharf has been extended for 105 ft. and new loopline laid.

Thevenard.—A house for the Harbourmaster has been erected.

Port Julia.—The super shed has been extended by 11 ft. 6 in., tram line extended, and additional stacking blocks provided.

Victor Harbour.—The slipway for the motor lifeboat was completed during the period.

Hopper Barge No. 13.—This barge was completed and taken over by the Board during the period.

No. 4 Dredger (Suction).—This dredger was taken over by the Board in November, 1925, and is now engaged in cleaning up the Outer Harbour Channel.

Surveys. Port Alelaide and Outer Harbour.—Surveys made and plans, etc., prepared in connection with the opening and closing of road east end of No. 2 Quay Wharf, and purchase of necessary land. Alignment of No. 2 Quay Wharf, Port Canal, and Soldier Producers' Market surveyed. Report and plan *re* rail connections to LeFevre's Peninsula supplied. Boundaries of railway reserve at Glanville and embankment south of Cable Company's Wharf surveyed. Contour plan from Poole & Steele to opposite False Arm supplied. Position of five-fathom buoy checked. Surveys made and plans provided in connection with transfer of land to Railways Commissioner. Detail survey of shore end of Semaphore Jetty made.

Outports.—Survey of shore end of proposed pier at Wallaroo and plans of land required prepared. Position of No. 8A beacon, Port Pirie, fixed, and ore bins, etc., at Railway Wharf surveyed.

Coobowie.—Survey made of land to be acquired.

Edithburgh.—Plan of reserve at jetty prepared.

Gawler Point.—General survey made for proposed deep-sea jetty.

Survey made of proposed jetty extension at Marion Bay.

Wakefield.—Harbour Improvement.—Evidence prepared and given to Railways Standing Committee.

Franklin Harbour.—Examination by Railways Standing Committee, of Franklin Harbour, for proposed deep-sea port.

Lacepede Bay (River port).—Information and estimate for Sir William Cresswell's scheme provided.

During the period various surveys and plans were made in connection with leases, land grants, etc., and land plans and sounding plans were made for court use in the arbitration case of Canal Company versus Harbours Board. A large amount of sounding and levelling work was also carried out during the period.

Deepening. No. 1 Dredger.—Cleaning up channel at Outer Harbour, raising 8,850 cub. yds.; deepening opposite Osborne Coal Wharf to 24 ft. L.W.O.S.T., raising 109,750 cub. yds.; deepening opposite Cement Company's Wharf to 27 ft., raising 51,755 cub. yds.; deepening opposite Vacuum Oil Company's Wharf to 27 ft., raising 35,870 cub. yds.; deepening opposite North Arm, Port Adelaide River, raising 4,650 cub. yds. Total amount raised, 210,875 cub. yds., deposited as follows:—89,875 cub. yds. to No. 2 dredger, 500 cub. yds. dumped ashore, 20,570 cub. yds. to No. 4 dredger, and 99,930 cub. yds. to sea. This dredger was at dockyard for overhaul for three months.

No. 2 Dredger.—Pumping dumped material ashore for reclaiming land at Osborne, behind Snowden's Beach and north of Lulu Terrace. Amount received and handled, 355,743 cub. yds. Under overhaul for one month.

No. 3 Dredger.—Deepening and widening channel opposite Vacuum Oil Company's lease, raising 8,780 cub. yds.; cleaning up explosive's berth, raising 12,650 cub. yds.; cleaning up Birkenhead Wharf to 25 ft., raising 1,750 cub. yds.; deepening to 24 ft. at Osborne Coal Wharf, raising 19,345 cub. yds.; excavating berth at Birkenhead for firefloat, raising 1,160 cub. yds. At Pirie, cleaning up B.H.A.S. Wharf to 20 ft., raising 10,860 cub. yds. Total amount raised, 54,545 cub. yds., disposed of as follows:—36,055 cub. yds. to No. 2 dredger, 7,390 cub. yds. to No. 4 dredger, 11,100 cub. yds. to sea. At dockyard for overhaul six weeks of the period.

No. 4 Dredger.—This dredger was finally taken over from contractors on November 16th, 1925, and commenced operations on 25th of same month. Cleaning up at Outer Harbour, deepening to 33 ft., raising 68,034 cub. yds., of which 67,534 cub yds. were dumped to sea, and 500 cub. yds. to No. 2 dredger; also pumped dumped material ashore to reclaim land north of Lulu Terrace. Amount received and handled, 52,712 cub. yds.

No. 5 Dredger.—Cleaning up Outer Harbour channel to 33 ft. L.W.O.S.T., raising 35,000 cub yds.; deepening Port Adelaide River to 27 ft. L.W.O.S.T. opposite and north of False Arm, raising 138,160 cub. yds. Total amount raised, 173,160 cub. yds., disposed of as follows:—108,895 cub. yds. dumped to No. 2 dredger, 550 cub. yds. to Birkenhead Wharf, 14,940 cub. yds. to No. 4 dredger, and 48,775 cub. yds. to sea. At dockyard for five weeks of period for overhaul.

No. 8 Dredger.—Deepening and widening channel opposite Vacuum Oil Company's lease, raising 97,605 cub. yds.; deepening and widening channel opposite North Arm, raising 45,475 cub. yds. Total amount raised, 143,080 cub. yds., of which 105,785 cub. yds. were dumped to No. 2 dredger, 140 cub. yds. to explosives mound, 9,560 cub. yds. to No. 4 dredger, 1,125 cub. yds. at Osborne, and 26,470 cub. yds. to sea. At dockyard for one month for overhaul.

No. 9 Dredger.—Cleaning up explosive's berth to 24 ft. L.W.O.S.T., raising 8,450 cub. yds.; deepening in front of Osborne Coal Wharf, raising 680 cub. yds.; pumping material ashore at Luff Point to reclaim low-lying land; quantity excavated, 13,500 cub. yds.; deepening berth for fishermen's landing, Port Pirie, raising 3,865 cub. yds.; also cleaning up Federal, Barrier, Queen's, and Baltic Wharves, raising 6,920 cub. yds. Total amount raised, 33,415 cub. yds.; of this amount 6,270 cub. yds. to No. 2 dredger, 13,500 cub. yds. pumped ashore at Luff Point, and 13,645 cub. yds. to sea. Also at Port Augusta, strengthening No. 4 light beacon. At dockyard for overhaul during one month of period.

No. 3 Crane.—Was out of commission for six months; for the balance of period was engaged in excavating berth at Port Price in front of wharf extension; raising 3,110 cub. yds., of which 158 cub. yds. were deposited on trucks on wharf and remainder, 2,952 cub. yds., dumped in creek; also cleaning up at various wharves, Port Adelaide, raising 408 cub. yds., dumped to No. 2 dredger.

Nos. 4 and 6 Cranes.—Assisting in construction work at Birkenhead Wharf, Osborne, and cleaning up wharves and excavating berth for firefloat, etc. No. 4 handled 6,625 cub. yds. and No. 6 9,903 cub. yds., making a total of 16,528 cub. yds., of which 7,955 cub. yds. were dumped to No. 2 dredger, 252 cub. yds. to No. 4 dredger, 6,946 cub. yds. to shore, and 1,375 cub. yds. to sea.

During the period a new tug (*Morglay*) of 750 I.H.P., was purchased by the Board and put into commission.

STATISTICS.

STATISTICAL REPORT FOR OUTPORTS FOR THE YEAR 1925-26.

1. Cargo passing over Port Pirie wharves.
2. Inter-state traffic at outports.
3. Overseas traffic at outports.
4. Gross tonnage of cargo handled at outports.
5. Vessels piloted at outports.
6. Number and tonnage of vessels arriving at outports.
7. Eyre Peninsula through goods traffic.
8. Cargo inwards and outwards over outport jetties.

Wharfage Earnings.—The total wharfage earnings for the year amounted to £105,724 3s. 11d., as follows:—

	£	s.	d.
Port Pirie	52,387	1	1
Other outports	52,389	11	6
Private add leased jetties ...	947	11	4
	£105,724	3	11

The principal contributing items were as follows:—

	£	s.	d.	
Coal	15,181	0	0	
Wheat	24,872	0	0	
Loose ores	22,924	0	0	
Barley	2,443	0	0	
Wool	1,522	0	0	
Super	1,478	0	0	
Salt	1,788	0	0	
Timber	5,544	0	0	
General cargo	11,000	0	0	approx.
Lime	605	0	0	
Plaster	1,975	0	0	
Empty returns	297	0	0	
Inflammable Oils	2,763	0	0	

Cargo Tonnage.—The gross tonnage of cargo passing over all outport wharves and jetties during the year totalled 2,640,083 tons—709,232 tons inwards and 1,930,851 tons outwards.

Private and Leased Jetties.—Traffic at these ports during the year under review compares favourably with previous years, 725,000 tons being the approximate tonnage.

Coastal Grain Traffic.—The following record illustrates the traffic in grain between the minor ports and the deep sea ports. Practically the whole of this grain was transhipped overside into vessels, direct for overseas or inter-state ports at the ports named:—

Port.	Tonnage.	
Wallaroo	29,979 tons	wheat
Lincoln	6,851 ,,	,,
Thevenard	8,966 ,,	,,
Pirie	6,390 ,,	,,
Victoria	245 ,,	barley
Hughes	789 ,,	,,
Total	53,220 tons	

Vessels Arriving at Outports.—Five thousand seven hundred and forty-one vessels, equalling 2,311,008 tons net and 4,027,868 tons gross, arrived at outports, including Port Pirie, during the year, compared with 5,428 vessels, 2,232,093 tons net and 4,099,636 tons gross, for 1924-25.

Overseas Traffic.—Approximately 742,352 tons of cargo were shipped directly overseas from outports, the principal items being:—

	Tons.
Concentrates	297,560
Lead	53,044
Wheat	381,643
Salt	2,172

Inward cargo from overseas totalled approximately 160,092 tons, the largest lines being—

	Tons.
Timber	26,500
Phosphate rock	21,319
Coke	47,640
Inflammable Oils	8,052
Sulphur	2,979

Inter-state traffic amounted to 350,532 tons inwards and 857,038 tons outwards, main items being as follows:—

INWARDS.	Tons.
Coal	281,570
Ores	9,701
Coke	9,359
Residues	26,629
Timber	10,595
OUTWARDS.	**Tons.**
Barley	25,979
Gypsum	10,379
Lead	80,011
Ores	657,459
Plaster	23,939
Salt	36,012

PORT SUMMARIES.

The following are short summaries of operations at the principal overseas ports.

Port Pirie.—Six hundred and twenty-six vessels, with a tonnage of 746,791 tons net and 1,198,837 tons gross, visited the port during the year, compared with 634 vessels, 729,677 net and 1,187,194 gross, in 1924-25, the largest being as follows:—s.s. *Anglo Chilean*, 9,097 tons gross, 25 ft. 1 in. draft,; s.s. *Pareora*, 8,435 tons gross, 24 ft. draft; and s.s. *Anglo Columbian*, 8,407 tons gross, 24 ft. 10 in.

Approximately 421,472 tons of cargo were handled inwards and 649,351 outwards, largest lines being as follows:—

INWARDS.	Tons.
Coal	235,772
Timber	33,275
General	13,925
Inflammable Oils	9,715
Coke	56,999
Ores	36,353
OUTWARDS.	**Tons.**
Loose Ores	372,599
Wheat	119,533
Lead	141,441

(B.H. Associated Smelters figures included.)

Wallaroo.—Traffic at this port shows a decrease on 1924-25, 418 vessels with a tonnage of 301,399 net and 507,957 gross, compared with 483 vessels with a tonnage of 334,116 net and 564,770 gross for 1924-25.

Approximately 254,400 tons of cargo were handled, including the following lines:—

Wheat, 178,473 tons; coal, 12,468 tons; calcines, 12,974 tons; superphosphate, 6,033 tons; phosphate rock, 23,133 tons; salt, 5,743 tons.

The largest vessel to visit the port was s.s. *Pareora*, 8,435 tons gross.

The deepest draught was the s.s. *Ypes Maru*, 29 ft. 1 in. and the s.s. *Yojin Maru*, 28 ft. 1 in.

Port Lincoln.—Four hundred and twenty-nine vessels, with a tonnage of 191,947 net and 341,698 gross, entered this port during the period under review, including 15 overseas vessels with a tonnage of 42,781 net and 66,347 gross. Approximately 128,000 tons of cargo were handled, including 55,655 tons of wheat shipped directly overseas. The tonnage handled is an increase of over 10,000 tons on the 1924-25 traffic.

The principal lines handled include:—

	Tons.
General	25,927
Coal	3,854
Superphosphate	13,138
Timber	8,896
Wheat	58,010

Among the overseas vessels was the s.s. *Teneriffa*, 5,655 tons gross, 29 ft. draught.

Port Thevenard.—Traffic at this point continues to increase. Nine overseas vessels entered the port during the year, their tonnage being 30,805 tons net and 49,634 tons gross; also 18 inter-state vessels of 15,525 tons net and 26,362 tons gross, and 64 coastal vessels of 13,599 tons net and 27,139 tons gross.

Among the overseas vessels was s.s. *City of Oran*, 7,394 tons gross, 23 ft. 6 in. draught.

Approximately 77,000 tons of cargo were handled, and included 46,142 tons of wheat for overseas and 17,425 tons of plaster exported inter-state. Other large lines were iron and steel, 1,012 tons; superphosphate, 1,451 tons; coal, 5,126 tons.

Edithburgh.—This port maintains a brisk inter-state trade in salt and gypsum. During the year 275 vessels arrived, representing a tonnage of 80,263 net, 159,014 gross. The largest lines handled included 26,164 tons salt, 6,571 tons gypsum, 2,491 tons barley and 4,106 tons general cargo.

The deepest draft vessel was the s.s. *Yarra*, 19 ft. 6 in. aft, 16 ft. 10 in. forward.

Minimums.—The total number of minimum packages passing over outport jetties during the year was 26,992, approximating a tonnage of 2,040 tons.

Port Dues in Yugoslavia.

Prevailing Rates of Exchange.

The Department of Overseas Trade has received from the Commercial Secretary at Belgrade the following official rates of exchange for the payment of port dues in October, which were published in the " Official Gazette " of 30th September:—

	Dinars.
1 gold Napoleon	219.00
1 pound sterling	276.30
1 American dollar	56.75
1 Canadian dollar	56.35
1 German mark (gold)	13.52
1 Belga	7.90
100 French francs	223.00
100 Swiss francs	1095.00
100 Italian liras	309.50
100 Dutch florins	2276.00
100 Roumanian leis	35.00
100 Danish crowns	1521.40
100 Swedish crowns	1528.50
100 Norwegian crowns	1500.00
100 Spanish pesetas	985.00
100 Greek drachmas	75.30

Personal enquiries regarding shipping and transport matters should be made at the City Office of the Department (Shipping and Transport Section), 73, Basinghall Street, London, E.C.2.

DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH.

Sir William James Larke, K.B.E., has been appointed by Order of Council, dated the 5th October, 1927, to be a member of the Advisory Council to the Committee of the Privy Council for Scientific and Industrial Research.